User's Manual

ES-300C

EPSON®

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EPSON®

ES-300C

User's Manual

FCC COMPLIANCE STATEMENT FOR AMERICAN USERS

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help.

WARNING

The connection of a non-shielded interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment. If this equipment has more than one interface connector, do not leave cables connected to unused interfaces.

FOR CANADIAN USERS

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le present appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables au appareils numériques de Classe B prescrites dans le règlement sur le brouillage radioélectriques édicté par le Ministère des Communications du Canada.

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IMPORTANT SAFETY INSTRUCTIONS

1. Read all of these instructions and save them for later reference.
2. Follow all warnings and instructions marked on the product.
3. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning the outside of the unit.
4. Do not use this product near water.
5. Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.
6. Slots and openings in the cabinet and the back or bottom are provided for ventilation; to ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.
7. This product should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
8. This product is equipped with a 3-wire grounding-type plug, a plug having a third (grounding) pm. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.
9. Do not locate this product where the cord will be walked on.

10. If an extension cord is used with this product, make sure that the total of the ampere ratings on the products plugged into the extension cord do not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.

11. Never push objects of any kind into this product through cabinet slots, as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on the product.

12. Except as specifically explained in the User's Manual, do not attempt to service this product yourself. Opening or removing those covers that are marked "Do Not Remove" may expose you to dangerous voltage points or other risks. Refer all servicing in those compartments to service personnel.

13. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

    A. When the power cord or plug is damaged or frayed.

    B. If liquid has been spilled into the product.

    C. If the product has been exposed to rain or water.

    D. If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions, since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.

    E. If the product has been dropped or the cabinet has been damaged.

    F. If the product exhibits a distinct change in performance, indicating a need for service.

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INTRODUCTION

The Epson® ES300C is a flatbed image scanner combining high performance and reliability with a wide range of features to provide full color or gray-scale monochrome scanning. The scanner's color and gray-scale capabilities make it ideal for applications such as desktop publishing, computer graphics, computer presentations, and software development. The scanner's compact and streamlined design make it easy to add to your office or home computer system.

Features

In addition to high-quality scanning and ease of operation, the ES300C offers the following features:

- Full color or gray-scale monochrome scanning
- Up to 256 gradation tones per pixel per color
- A maximum scanning area of 8.5 inches by 11.7 inches, providing for U.S. letter-size paper
- Nineteen scanning resolutions from 50 dots per inch to 600 dots per inch
- A zoom function that allows you to reduce or enlarge the image size from 50 percent to 200 percent in one percent increments
- Various image processing features, including gamma correction and color correction, for better image reproduction
- Software-controllable scanner functions
- A direct print function that lets you use the scanner as a simple color copier
- Two interfaces to suit your computer system: with an IBM® compatible computer, you use the bidirectional parallel interface; with a Macintosh® computer, you use the optional SCSI interface.

Using the ES-300C With Your Computer

To use the scanner, you need a software package to read the scanned images. Programs are available from your Epson dealer for use with IBM compatible computers and Macintosh computers. Other graphics programs and scanner utilities also support the ES300C.

Be sure to choose a program that lets you use all the sophisticated features of the scanner.

About This Manual

This user's manual provides fully illustrated, step-by-step instructions on setting up and maintaining your Epson scanner.

- Chapter 1 contains information on setting up the scanner, including unpacking and testing. Be sure to read and follow these instructions first.
- Chapter 2 provides important information on operating the scanner and using the scanner functions.
- Chapter 3 describes general maintenance and transportation of the scanner.
- Chapter 4 contains troubleshooting information. If the scanner does not operate properly, see this chapter for a list of problems and solutions.
- Appendix A provides the technical specifications for the scanner.
- Appendix B describes the bidirectional parallel interface board and includes instructions on how to connect the scanner to an IBM compatible computer.

- Appendix C describes the SCSI interface board and includes instructions on how to connect the scanner to a Macintosh.
- Appendix D contains information on how to use the direct print function.

At the end of this manual, you will find a glossary of terms and an index.

Conventions used in this manual

WARNINGS must be followed to avoid bodily injury.

CAUTIONS must be observed to avoid damage to your equipment.

Notes contain important information and useful tips on the operation of your scanner.

Where to Get Help

Customer support and service for Epson products are provided by a network of authorized Epson Dealers and Customer Care Centers throughout the United States. Epson America provides product information and support to its dealers and Customer Care Centers.

Therefore, we ask that you contact the business where you purchased your Epson product to request assistance. If the people there do not have the answer to your question, they can obtain it through our dealer support program.

Epson is confident that this policy will provide you with the assistance you need.

Call the Epson Consumer Information Center at 1-800-922-8911 for the following:

- The location of the nearest Epson dealer
- The location of the nearest Customer Care Center
- Information on Epson User Groups.

To locate or purchase accessories or supplies, contact your nearest Epson dealer or call 1-800-873-7766.

Chapter 1

SETTING UP THE SCANNER

1

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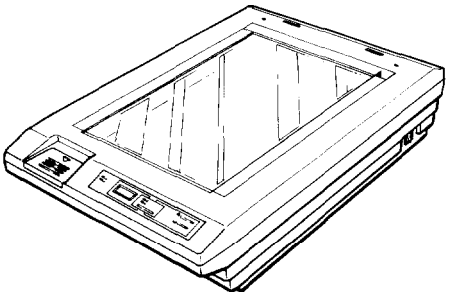
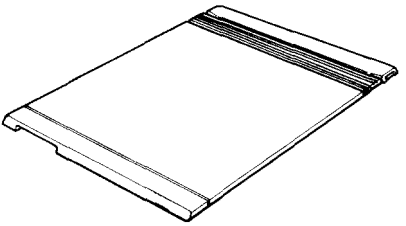
Unpacking the Scanner

This chapter describes how to set up and test your scanner.

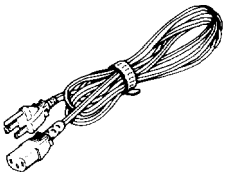
When you unpack the scanner, make sure that you have all the parts and that **none** have been damaged. In addition to this User's Manual and the *Epson Color Image Scanner Image Samples* booklet, you'll find these items:



Scanner main unit



Document cover



Power cable

After removing the parts, save the packing materials in case you need to transport your scanner.

Choosing a Place for the Scanner

Keep the following in mind **when** selecting a place to set up the scanner:

- Place the scanner on a flat, hard, stable surface.
- Place it close enough to the computer for the scanner cable to reach.
- Leave adequate room around the scanner to allow for easy operation and maintenance. Make sure you can easily place and adjust a document on the scanner.
- Use a grounded outlet; do not use an adapter plug.
- Avoid locations that are subject to direct sunlight, excessive heat, moisture, or dust.
- Avoid electrical outlets controlled by wall switches or automatic timers.
- Avoid using outlets that share a circuit with large motors or electrical appliances; this could cause fluctuations in power voltage.
- Keep your entire computer system away from potential sources of electromagnetic interference such as loudspeakers or the base units of cordless telephones.
- Do not connect more than one interface cable to the scanner at a time.
- Do not place any objects on top of the scanner.

CAUTION: Do not operate the scanner without removing the transportation screw.

Assembling the Scanner

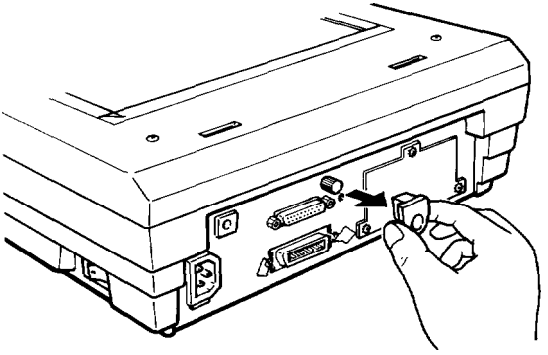
After you've found the best place **to** set up your scanner, the next step is to assemble the parts.

Removing the Transportation Screw

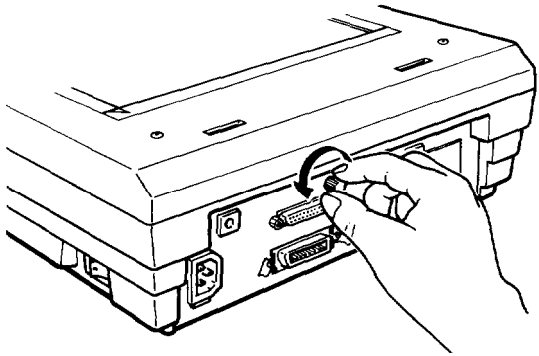
Before plugging in the scanner, you must remove the transportation screw. This screw secures the carriage mechanism during transport to protect it from damage due to shock or vibration.

CAUTION: Do not plug in the scanner before removing the transportation screw.

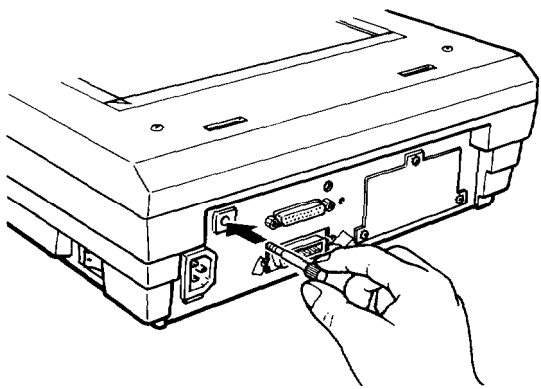
1. Place the scanner on a flat, stable surface with the back panel facing you.
2. Locate the black rubber stopper in the center of the back panel. This stopper protects the transportation screw.
3. Remove the rubber stopper by pulling it straight out toward you.



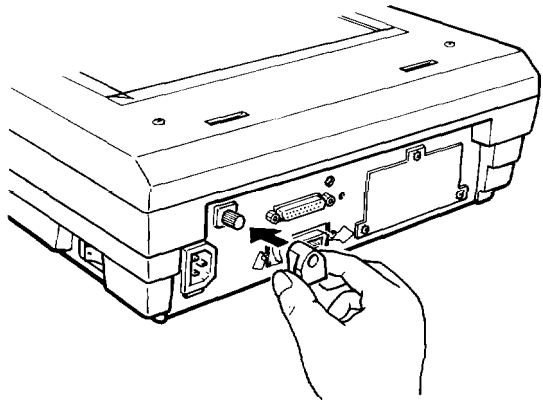
4. Remove the screw by turning it counterclockwise.



5. Insert the transportation screw into the storage hole **on** the left side of the back panel. Push the screw all the way into the hole; it does not screw in.



6. Place the stopper over the transportation screw with the round side of the stopper toward the top of the scanner.

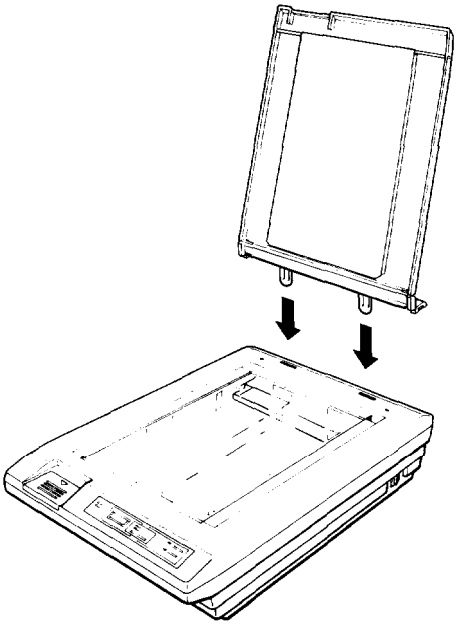


Note: Do not discard the transportation screw or the stopper. You will need to replace the transportation screw whenever you transport the scanner.

Attaching the Document Cover

The document cover keeps outside light from interfering with the scanning process.

1. Place the scanner on a flat, stable surface with the control panel facing you.
2. Hold the document cover perpendicular to its base while holding the base parallel to the scanner.

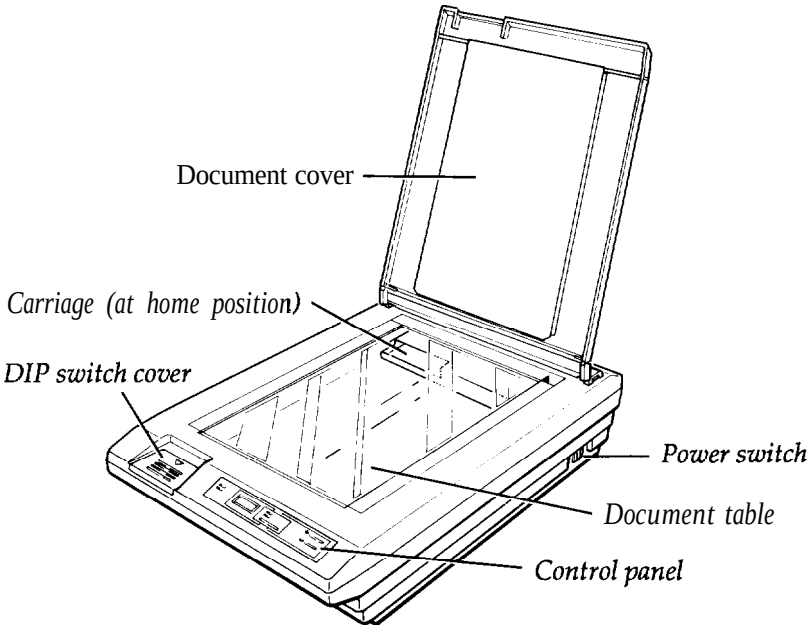


3. Insert the metal tongues on the base of the document cover into the slots at the back of the scanner. The tongues slide in easily; do not force them.

You can remove the document cover to scan thick or bound material, such as books.

Scanner Components

Now that the scanner is assembled, you can examine the scanner components.



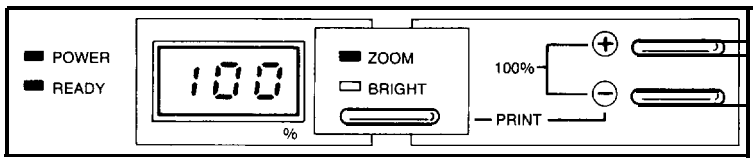
The *document* cover prevents outside light from interfering with the scanning process. Close the cover when you are scanning a document. You can remove the cover to scan bound or thick material.

You place the document to be scanned on the *document table.*

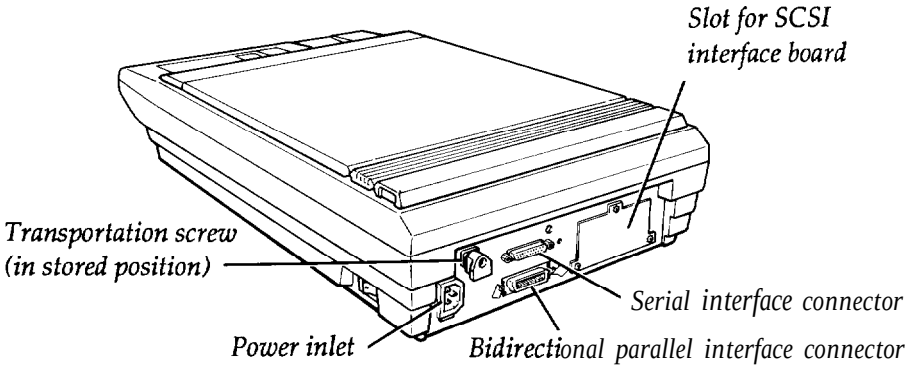
The *carriage* contains the optical sensor and three fluorescent lamps. The carriage **moves** when scanning a document.

You use the *power switch* to turn the scanner on and off, or to reset the scanner in case of an error.

The *control panel* contains indicator lights that show the status of the scanner, and buttons for controlling the brightness, zoom, self test, and direct print features.



DIP switches (located under the cover) let you select settings for the direct print function.



You connect the power cable to the *power inlet.*

The *transportation* screw is shown in its stored position.

If you are using the scanner with an IBM compatible computer, you connect the computer's interface cable to the *bidirectional parallel connector* after installing a bidirectional parallel interface board in your computer.

If you are using the scanner with a Macintosh computer, you install the SCSI interface board in the *interface board slot.* You then connect the computer's interface cable to the SCSI connector on the board.

The *serial interface connector* is also available where the bidirectional parallel interface or SCSI interface is not suitable.

Testing the Scanner

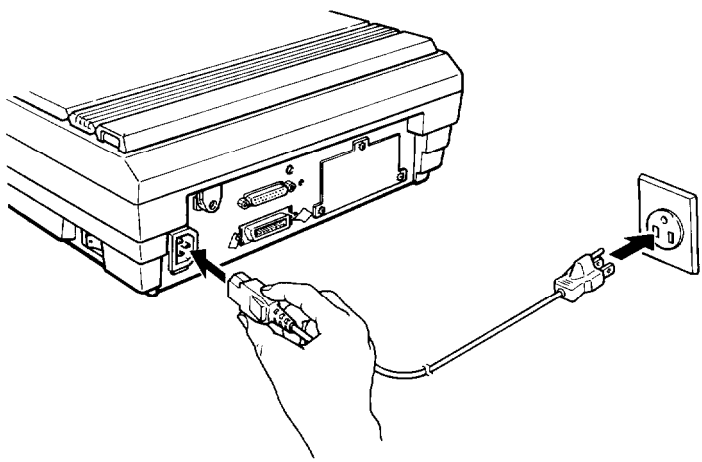
Now that your scanner is fully assembled, you can use its built-in self test function to see that it is working correctly before you connect it to your computer. You should perform this test to make sure the scanner was not damaged during shipping.

Before running the self test, you need to connect the scanner to an electrical outlet.

Plugging in the Scanner

CAUTION: Make sure you have removed the transportation screw before you connect the scanner to a power source.

1. Make sure the scanner is turned off.
2. Firmly connect the power cable to the power inlet at the back of the scanner.



3. Plug the power cable into a properly grounded electrical outlet.

Turning on the Scanner

When you turn on the scanner, **the POWER** and **ZOOM lights** come on. The display shows 100, which indicates a zoom value of 100 percent.

The scanner performs a self-initialization; it returns the carriage to **the** home position and checks the fluorescent lamps. After a few seconds, **the READY light comes on.**

CAUTION: Whenever you turn off **the** scanner, wait at least ten seconds before turning it back on. Rapid switching on and off can damage the scanner.

Running the Self Tests

The scanner has two self-test modes: page sequence and line sequence. In page sequence mode, the carriage scans the document table three times, **once** for each of **the** fluorescent lamps (green, then red, then blue). In line sequence mode, the carriage scans **the** document table once using all three lamps.

During a self test, **the** scanner does **not scan** an image or send any image data to the computer. Therefore, you do **not** need to connect the scanner to a computer to perform **the** self test. If the scanner is connected to a computer, you can resume normal operation after performing a self test.

To start a self test, follow these steps:

1. Make sure **the** scanner is turned off.
2. Open the document cover so you can see how the scanner operates during **the** self test.

3. To perform the self test in page sequence mode, hold down ⊕ (Increase) while you turn on the scanner. The carriage makes three passes from the home position to the front of the scanner; first with the green light on, then the red light, and then the blue light.

   To perform the self test in line sequence mode, hold down ⊖ (Decrease) while you turn on the scanner. The carriage makes one pass from the home position to the front of the scanner using all three lamps.

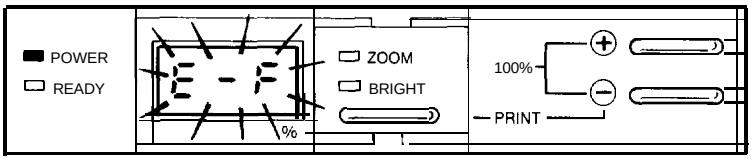
   When the scanner completes the self test, it moves the carriage back to the home position and turns on the READY light.

4. You can stop a self test at any time by turning off the scanner.

> **CAUTION**: Whenever you turn off the scanner, wait at least ten seconds before turning it back on. Rapid switching on and off can damage the scanner.

If the self test does not seem to perform properly, check the following items:

1. If the scanner does not come on, make sure that the power cable is properly connected to the power inlet on the back of the scanner and to an electrical outlet.
2. If the display on the control panel shows the fatal error message E -F, check that the transportation screw is removed.



See Chapter 4, Troubleshooting, for details on scanner errors.

Connecting the Scanner to Your Computer

After testing the scanner, you are ready to connect it to your computer.

If you plan to use the ES-300C with an IBM compatible computer, you must install the bidirectional parallel interface board in your computer. You then connect the scanner to the computer using the bidirectional parallel interface. See Appendix B for details on how to do this.

If you plan to use the ES-300C with a Macintosh computer, you connect them using the SCSI interface. See Appendix C for complete details on how to install the SCSI interface board in your scanner and how to connect the scanner to the computer.

Setting Up Your Application Software

After connecting the scanner to your computer, you are ready to begin using the scanner. See the documentation that comes with your scanner utility program or interface kit for details on how to use the software.

Chapter 2

USING THE SCANNER

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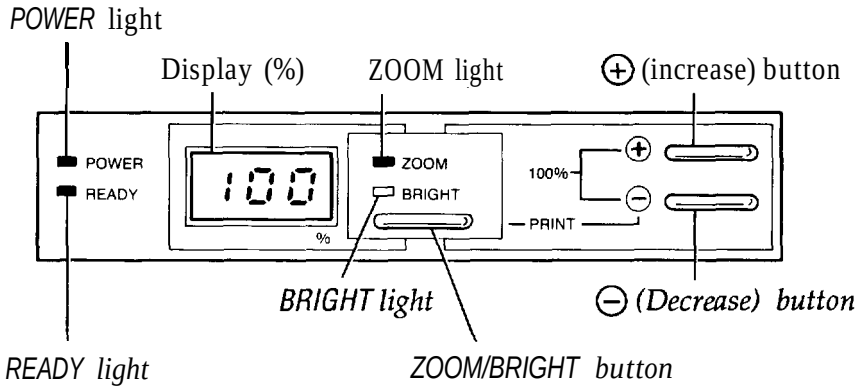
Operating the Control Panel

The ES-300C scanner's control panel consists of four indicator lights, an alphanumeric display, and three buttons. The control panel shows the current status of the scanner and allows you to start the self test and the direct print function (see Appendix D).



Note: Do not use the control panel to set the zoom or brightness level unless you are using direct print as described in Appendix D. Your software commands override the control panel settings.

The Control Panel

This section describes the lights, display, and buttons on the control panel and how you initiate a self test and direct print function.

Indicator lights

POWER (green)
On when the POWER switch is on and power is supplied.

READY (green)
On when the scanner is **ready to** receive commands from the computer software. Flickers during scanning.

ZOOM (orange)
On when the display is in zoom mode. Use the ⊕ (Increase) and ⊖ (Decrease) buttons to change the zoom value shown on the display when you are using the direct print function.

BRIGHT (orange)
On when the display is in brightness mode. Use the ⊕ (Increase) and ⊖ (Decrease) buttons to change the brightness value shown on the display when you are using the direct print function.

The display

% Display (green, three-digit segment)
The display indicates the zoom value when the control panel is in zoom mode and indicates the brightness value when the control panel is in brightness mode. It also indicates when an error occurs in the scanner. The scanner is in the zoom mode when you first turn on the power.

Buttons

ZOOM/BRIGHT
Pressing this button selects either zoom or brightness. **ZOOM/BRIGHT** works only when the **READY** light is on (when the scanner is in the ready state). The display is in zoom mode when you first turn on the power. Use this button to select zoom or brightness only when you are using the direct print function.

⊕ (Increase)
Pressing this button increases the zoom value (in increments of 1%) between 50% and 200% and increases the brightness value in increments of 1 between seven values, from -3 (lightest) to 3 (darkest). Use this button to adjust zoom and brightness only when you are using the direct print function.

⊖ (Decrease)
Pressing this button decreases the zoom value (in increments of 1%) from 50% to 200% and decreases the brightness value in increments of 1 between seven values, from -3 (lightest) to 3 (darkest). Use this button to adjust zoom and brightness only when you are using the direct print function.

Pressing ⊕ and ⊖ simultaneously resets **the zoom** value to 100%.

Self test function

By holding down ⊕ or ⊖ while you turn on the scanner, you can start the scanner's self test function. See Chapter 1 for more information.

Direct print function

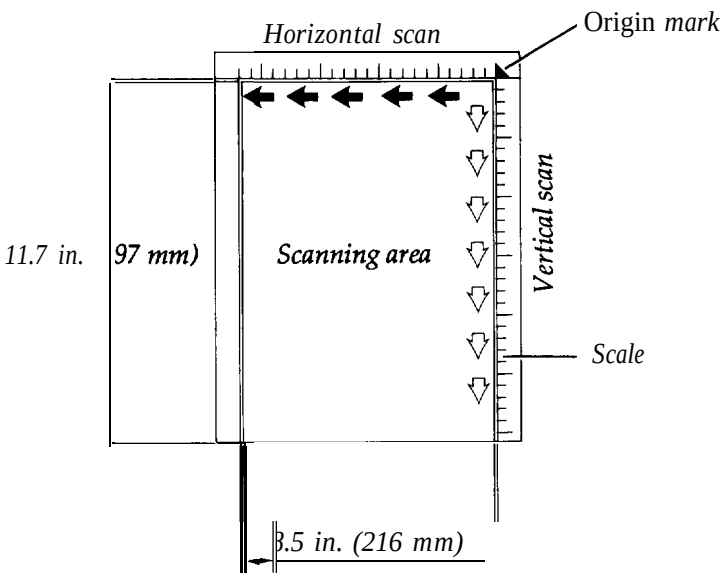
The direct print function transfers a color image directly from your scanner to your printer. To use the direct print function you must have a special parallel interface cable. Consult your dealer to obtain the proper cable. Press down both the **ZOOM/BRIGHT** and ⊖ buttons to start the direct print function. See Appendix D for more information.

Using the Document Table

This section tells you about the document table and how to place documents and bound materials in the scanner.

The Document Table

The document table has an origin mark and scales to help you adjust the document position. You can scan documents of any size up to and including U.S. letter and A4 documents.



Note: There is an unscannable margin around the four edges of the document table. It measures .12 inches (3 mm) at the top, .08 inches (2 mm) at the right, .16 inches (4 mm) at the left and .24 inches (6 mm) at the bottom.

Origin

The origin, which is the starting point of the scanning area, is located in the upper right corner of the document table as shown in the previous illustration. When placing your document face down on the scanning area, you normally align the upper right comer of your document with the origin.

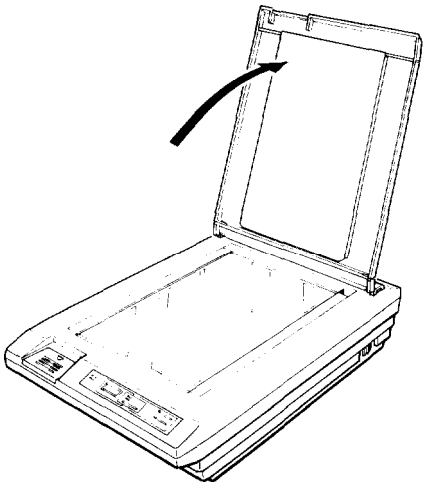
Horizontal scan **and vertical scan**

The direction along the top (shown above by black arrows) is called the horizontal scan. The direction along the side (shown above by white arrows) is called the vertical scan.

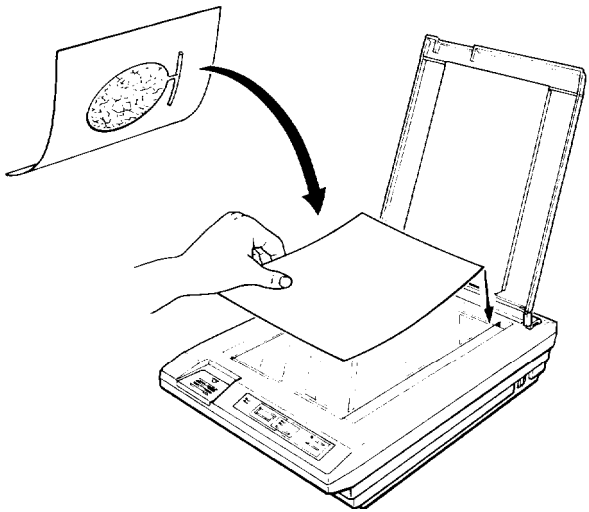
Placing a Document in the Scanner

To prepare your document for scanning:

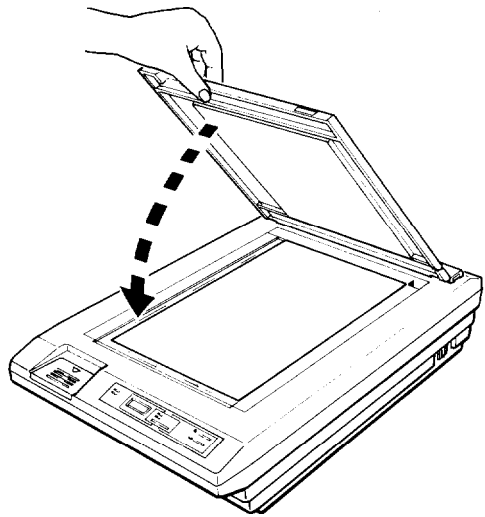
1. Open the document cover.



2. Place the document face down on the document table. Adjust the document position using the origin mark and scales.



3. Close the document cover gently to avoid moving the document.



Note: Make sure that the document is flat against the glass surface so that the image is properly focused. Also be sure to close the document cover to prevent interference from external light.

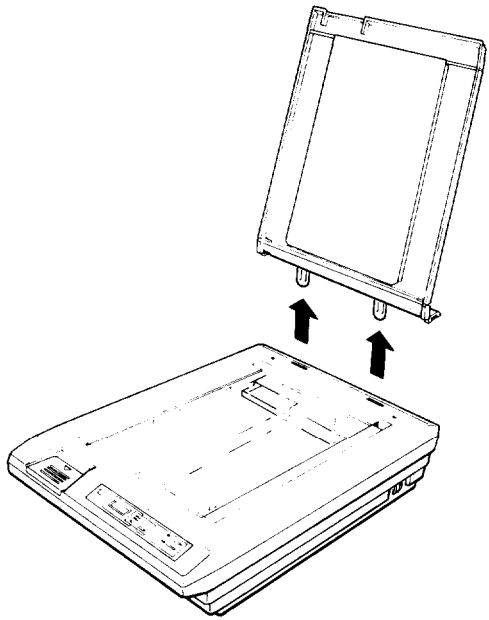
CAUTION:

- Always keep the document table clean. See Chapter 3 for information on cleaning the scanner.
- Avoid twisting the document cover when you open or close it.
- Do not leave photographic paper face down on the document table for an extended period of time because it may stick to the glass.
- Do not apply too much pressure on the document table; excessive pressure could break the glass.

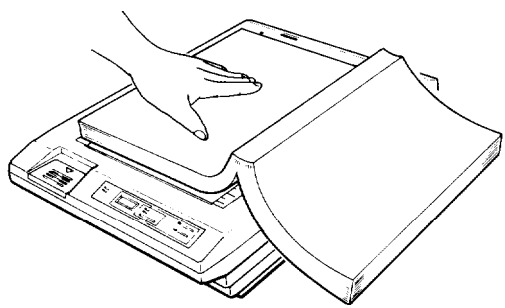
Placing Bound Material in the Scanner

To scan thick or bound material, such as a book, remove the document cover for easier alignment.

1. Lift up the document cover. Lift the base up and out of the scanner.



2. Place the book on the document table.



3. Push down gently on the book spine so that its surface is flat against the document table.

Preparing Scanner Software

For the scanner to operate, it must interact with the computer using various settings for scanning and image data transfer. Therefore, to use the scanner you need a software utility program that enables your computer to communicate with the scanner. To purchase the proper software for your scanner, consult your Epson dealer.

Using Application Software

The main advantage of using an image scanner is that you can edit the scanned images on a computer. Various software packages are available for creating and editing images. Some software packages allow you to scan images directly. Others require a utility program to scan the image and then convert it to a usable file format.

Your software may have an installation or setup procedure that lets you select scanner types from a list of input devices. If the ES-300C is not listed, contact your software manufacturer to see if there is a software update.

> Note: The number and type of scanner functions you can use depends on your software. See your software manual for details on available functions.

Programming

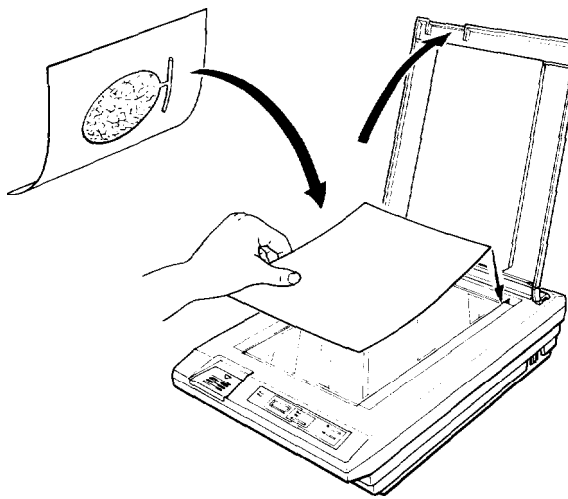
If you are an experienced programmer or are familiar with programming languages, you may be interested in the programmer's manual which is available from your dealer. It fully describes software control of the scanner. This manual explains the formats and functions of the scanner commands and handshaking method, as well as some programming tips for getting the best performance out of your scanner.

Scanning an Image

Your scanner can accommodate a maximum document size of 8.5 inches x 11.7 inches, slightly larger than **U.S.** letter size or A4 size.

> Note: There is a small unscannable margin around the four edges of the document table. See page 2-5.

1. Turn on the scanner and then the computer. Check that the scanner's **READY light** is on.
2. Place the document face down on the document table.



3. Close the document cover.
4. Start the scanner software on **the** computer and scan the image.

> **Note:** If **any** one of the three error **messages (E-C , E - I,** or **E - F)** appears on the display, see Chapter 4.

Using the Scanner Functions

Numerous image processing functions are built into the ES-300C and many can be combined to produce a variety of effects.

Note:

- Do not use DIP switch settings or the control panel to control scanner functions unless you are using the direct print function (see Appendix D).
- With some scanner software, not all of the scanner functions may be available or the range of settings may be limited. When using application software, see its documentation for details.
- Because each image, CRT, and printer combination creates a unique scanning scenario, it is recommended that you use your scanner software to experiment with a variety of functions and settings to achieve the output you like best.

ES-300C functions and tips on how to achieve the best results using your scanner are covered in this chapter. The *Epson Color Image Scanner Image Samples* booklet illustrates some of the effects you can create with these image processing functions. See your software manual for details on using these functions.

Output Resolution

The output resolution determines how many pixels, or dots, are used for reproducing an image. Resolution is measured in units of dpi (dots per inch) and can be selected independently for the horizontal scan and vertical scan. The ES-300C offers 19 settings: 50, *72, 75, 80, 90, 100,* 120, 144, 150, 160, 180, 200, 240, 300, 320, 360, 400, 480, and 600 dpi.

Normally you should choose the setting that matches the resolution of your output device, usually your CRT display or printer. To find a matching resolution, check your software manual or follow the guidelines below.

Dots per Inch	Output Resolution
72,75	CRT displays
72, 144	9-pin dot matrix printers
180, 360	24-pin dot matrix printers
75, 150, 300, 600	Laser printers
100, 200, 300, 400	Facsimile (fax) transmission

Note: Use your software to control the zoom and brightness settings unless you are using the direct print function. (See Appendix D). Software control settings have priority over those made from the control panel, and the current settings are shown on the display.

Zoom

Use the zoom function to reduce or enlarge the size of the output image. The zoom value can range from 50% to 200% in increments of 1%. Use the software to set the horizontal scan and vertical scan values independently; when the values are different, the display shows only the larger of the two values.

Brightness

There are seven brightness levels for scanning images, ranging from -3 (lightest) to 3 (darkest) with 0 (the default) as the normal setting. Use darker settings for faint original images, line art, and text characters. Use lighter settings for dark original images. You can combine the brightness function with all other functions.

Scanning Area

Use this function to scan a specific portion of the original image. You can choose a rectangular area anywhere within the maximum scanning area of the scanner as determined by the current resolution and zoom settings.

Data Format

The data format determines how many bits are used to represent a pixel. A pixel (picture element) is the tiniest area a scanner "reads." The number of bits/pixel (from 1 to 8 bits/pixel/color) determines how many colors or how many shades of gray the scanned image data can represent. The larger the number of bits per pixel, the greater the number of shades of gray can be represented. In monochrome (black and white) scanning, for example, a data format of 8 bits/pixel can represent up to 256 shades of gray.

Color Mode

The color mode specifies either color scanning or monochrome (black and white) scanning. In color scanning, you can choose either page sequence mode or line sequence mode. In monochrome scanning you can specify a dropout color, as discussed below.

Color page sequence mode

Use this mode when you don't require the color correction function. The carriage scans the document table three times, once for each color: green, then red, then blue.

Color line sequence mode

Use this mode when you require the color correction function to achieve more accurate color. The carriage makes only one pass, reading each of the three colors for each line.

Monochrome mode (standard)

Use this mode when you want to scan a black and white image. If you scan a color image in monochrome, you may need to specify a dropout color to recover or delete detail. See Dropout color below. Standard monochrome scanning uses all three lamps so that the original image is scanned with white light, thus minimizing the dropout color.

Dropout color (monochrome scanning only)

Use this mode when you scan a color image in monochrome and you need to recover detail, eliminate background color, or eliminate unwanted detail. Dropout color is the color that is not recognized by the scanner. You can choose either green, red, or blue, depending on the colors on the original images.

Halftoning Mode

Halftoning is a digital process which simulates continuous gray tones or continuous colors. Some printers, however, cannot print these continuous tones. Halftoning is suitable for original images, such as photographs, that have continuous tones. Use halftoning if your output device can reproduce only 1 to 2 bits/pixel/color image data.

> **Note:** Avoid changing the size of a halftoning processed image with your application software. Use the scanner's zoom function instead to select the desired image size.

You can enable or disable the halftoning process itself, and select from the three halftoning modes, A, B, or C.

Halftoning mode A

Use this mode for scanning most images with continuous tones. This mode produces higher contrast images than mode B. Available for 1 and 2 bits/pixel/color data in all color mode settings.

Halftoning mode B

Use this mode for images that contain large areas of similar tones. The image is converted to soft tones to blend each tone into the next. Available for 1 bit/pixel/color data. This mode is not effective when color line sequence is selected.

Halftoning mode C

Using mode C may produce better results if you print your image on a dot matrix printer. The image is represented in a similar way to the images in newspaper printing; the gradations in the original image are represented by clusters of different numbers of dots. Available for 1 bit/pixel/color data. Mode C is not effective when color line sequence is selected.

Gamma Correction

Gamma correction helps you make the image you print or display on your computer screen more closely resemble the original image you are scanning.

Use your scanner software to choose from five settings including three general printer types and two CRT display types. You can combine gamma correction with all other scanner functions. When Printer output A, B, or C is selected, the image looks faint when viewed on a CRT display but looks correct when printed.

Printer output A

Use this setting for high density printers, such as 24-pin and laser printers. If your results are unsatisfactory, try Printer output B.

Printer output B

Use this setting for low density printers, such as 9-pin printers and printers that produce finer dots, such **as** laser printers and ink jet printers. If your results are unsatisfactory, try Printer output A.

Printer output C

Use this setting for enhanced contrast and definition when scanning images **that** contain both pictures and text.

CRT display A

Use this setting for most computer display types that cannot display multiple tone levels, such as digital-input displays, or 8 to 16 color displays. This setting is also suitable for line art and text characters because the image data represents the light intensity of the original image in **1:1** ratio.

CRT display B

Use this setting for an analog-input display system that can display multiple levels of tones.

Color Correction

Color correction tells the scanner **what** type of printer or computer screen display you are using to view **the** scanned image so that the scanner processes color appropriately. Color correction must be used with the color line sequence mode. The four settings are for:

- CRT displays
- Impact dot matrix printers
- Thermal transfer printers
- Ink jet printers.

To disable this function, simply choose color page sequence mode or monochrome mode.

Tips on Using the Scanner

This section provides you with some tips and further information for using the scanner.

> Note: Use these guidelines and your scanner software to obtain better results when scanning and reproducing images.

Scanning Line Art and Characters

If the line art contains many straight lines, adjust the document position so that lines are aligned with the horizontal scan or vertical scan directions. If it is placed askew, the straight lines will have jagged edges.

Adjusting for Different Document Types

Focusing

For the best focus, place the document flat against the document table. As the distance from the document table increases, the focus is lost and the image is blurred or darkened.

Document surface

For better scanning results, make sure the document surface is smooth. If there is a pasted-up area, colors may blur at the edge of this area. Textured and embossed surfaces may produce blurred images because light from the scanner lamps is not evenly reflected on them.

Transparent document

Transparent material may not be scanned properly because the ES-300C scanner scans an image by reflecting light off the document surface. In the case of overhead projector transparencies, if you can clearly recognize the image on a transparency by placing it on an opaque surface, it can be scanned. Film negatives or 35 mm slides cannot be scanned because the images on them are too dark and too small for the scanner to recognize.

Thin materials

When the document paper is too thin, the image on the reverse side of the page or on the next sheet of paper may appear as a ghost-like image superimposing the desired image. If this "bleed" occurs, photocopy the image on a heavier bond paper and rescan the image.

Minimizing the Moiré Pattern

A moiré pattern is the repeating interference pattern that appears overlapping a scanned image. This usually occurs with printed material processed with screens and when the pitch of the screen interferes with that of the scanner's sensor. Moiré does not occur with ordinary photographs because they do not cause interference.

Although a moiré pattern does not occur often, once it occurs it is difficult to remove completely. To minimize the effect of the moiré pattern, you may try the following:

- Place a transparent plastic sheet between the document and the document table so that the document is slightly out of focus.
- Place the document slightly angled or move its position slightly.
- Consult your software manual for other solutions.

The Scanning Speed

As the amount of image data increases, the time to scan the image and transfer the image data increases. The amount of image data increases as you increase the resolution, data format, zoom, and scanning area.

The speed is also affected by the interface transfer speed, computer performance, and software performance.

Chapter 3

MAINTAINING AND TRANSPORTING THE SCANNER

Cleaning the Scanner 3-2
Changing the Fluorescent Lamps 3-3

Transporting the Scanner. 3-4

3

Cleaning the Scanner

To keep your scanner operating at its best, you should clean it periodically.

Clean the outer case with mild detergent dissolved in water.

If the glass of the document table gets dirty, clean it with a soft dry cloth. If the glass is stained with grease or another hard-to-remove material, use a small amount of glass cleaner on a soft cloth to remove it. Wipe off any remaining liquid with a dry cloth.

CAUTION:

- Be careful not to scratch or damage the glass of the document table, and do not use anything hard or abrasive to clean it. A damaged glass surface can decrease scanning quality.
- Never use alcohol, thinner, or corrosive solvent to clean the scanner. These chemicals can damage the scanner components as well as the case.
- Be careful not to spill water into the scanner mechanism or electronic components. This could permanently damage the mechanism and circuitry.
- Do not spray lubricants inside the scanner.
- Never open the case of the scanner.

Changing the Fluorescent Lamps

The luminosity of the fluorescent lamps decays over **a** period of time. If the lamps break or are too dim to operate normally, the fatal error message **(E-F)** appears on the display. When this happens, a dealer or service center must replace **the** lamp assembly.

CAUTION: Never open the case of the scanner. If you think repairs or adjustments are necessary, consult your dealer.

Transporting the Scanner

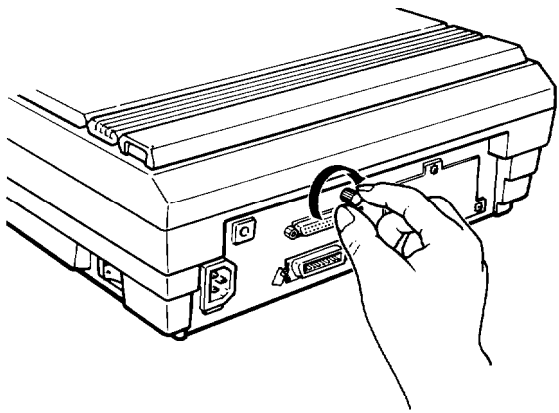
When you transport the scanner or store it for an extended period, follow the steps below to secure the **carriage.**

1. Turn on the scanner and wait until the carriage moves to the home position (the back of the scanner>. Then turn off the scanner.

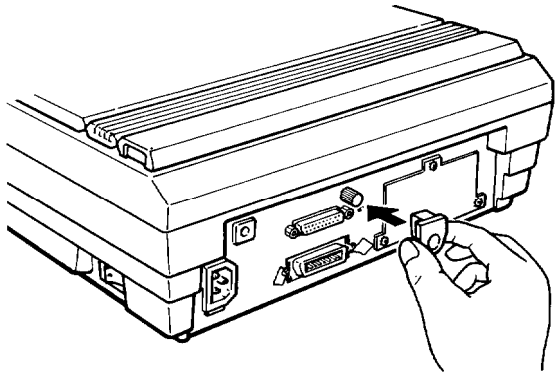
Note: If the scanner is not operating properly and the carriage does not return to the home position, gently lift up the front of the scanner. Wait until the carriage comes to rest at the back of the scanner; then set it back down.

CAUTION: Failure to secure the carriage whenever you transport the scanner may cause additional damage resulting in extra repair cost.

2. Remove the stopper and transportation screw from the storage hole. Place the screw in the center hole and screw it in to secure the carriage.



3. Attach the stopper to the transportation screw so that the straight edge of the stopper is aligned with the upper case as shown below.



4. Remove the document cover.
5. Repack the scanner and document cover separately, using the original packing materials and carton.

CAUTION: When you unpack the scanner at its destination, do not forget to remove the transportation screw before operating the scanner.

Chapter 4

TROUBLESHOOTING

Error Messages. 4-2
Command Error. 4-2
Interface Error 4-3
Fatal Error 4-4

Problems and Solutions 4-5

4

Error Messages

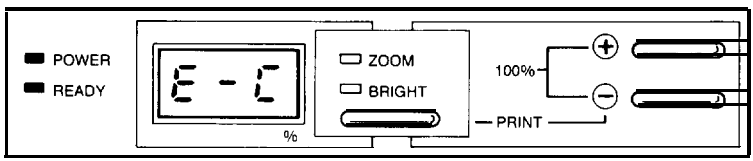
When the scanner detects an error, the display on the control panel shows **a** corresponding error message.

In case of an error, you may need to retry a scanning operation with the software or reset the scanner. To reset the **scanner,** turn it off, wait 10 to 15 seconds, and then turn it on again.

There are three types of errors, as shown below.

Command Error

Error indication: The error message **E-C** appears. The **READY** light remains on. The scanner waits for a correct command.

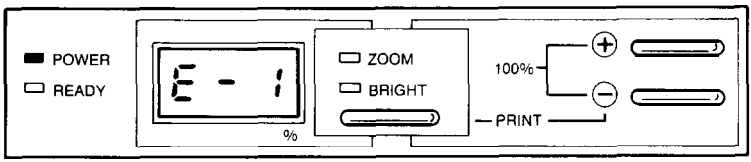


Possible causes: Invalid command is received.
Invalid parameter is received.

To recover: Check that the settings on your scanner software are correct; then retry the scanning operation to send a correct command. Reset the scanner after a command error only if necessary.

Interface Error

Error indication: The error message **E-I** appears. The **READY** light goes off. The fluorescent lamps go out and the scanner stops operating.



Possible causes: Wrong communication protocol.

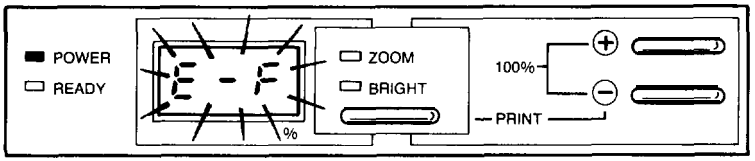
Interface connection is broken (the connector is unplugged or the cable wire is broken).

The host computer does not respond to the scanner for more than 30 seconds.

To recover: Turn off the scanner. Check the interface connection and settings on the scanner as well as on your computer and software. Turn on the scanner.

Fatal Error

Error indication: The error message **E-F** appears and blinks. The **READY** light goes off. The fluorescent lamps go out and the scanner stops operating.



Possible causes: One or more fluorescent lamps are broken or require replacement.

The transportation screw is not removed and the carriage cannot move.

The scanner is broken.

To recover: Turn the scanner off. Check to see if the transportation screw is removed; then turn on the scanner. (See Chapter 1.) Consult your dealer if you encounter this error again.

Problems and Solutions

This section discusses typical problems and offers possible solutions. For advice on getting better images, see Chapter 2.

The problems you may encounter while using the scanner often involve the operation of your software and computer. Problems fall in the following major categories:

- Incorrect setup of the interface
- Inappropriate selection of the scanner functions
- Incorrect setup of your computer or software
- Incorrect operation by your software or program.

Also see the documentation for your software, computer, and printer for possible solutions.

Problem	Solution
The scanner does not scan or stops scanning.	
The scanner does not *come on. (The POWER light does not come on.)*	See that the power cable is correctly plugged into the scanner and the power outlet. Try the self test function. (See Chapter 1.) If the scanner does not operate as described, consult your dealer. Check the outlet you are using with another electrical device.

Problem	Solution
The scanner does not scan or stops scanning (continued).	
The READY light does not come on.	Check that the scanner is correctly connected to **the** computer. Check that the interface settings and the cable type are correct.
The scanner does not start scanning, or the scanner does not respond to the software.	Check that the scanner's **READY** light is on. See if the scanner shows an error message. (See the Error Messages section earlier in this chapter.) Check that you have selected the correct interface port and settings with your software. Check that the interface board on your computer is properly installed. See Chapter 1 and either Appendix B (for IBM compatible computers) or Appendix C (for Macintosh computers). If you have other expansion boards on your computer, check that they are **not** interfering with the interrupt setting of the interface board for your scanner. (See your computer manual.)
The fluorescent lumps come on but the scanner does not scan.	If you are using a standard parallel interface cable, the scanner may not work properly even though the same cable works with a parallel printer. See Appendix B.

Problem	Solution
The scanner software and/or your computer are not operating properly.	
The scanner software does not work properly.	Check that you have correctly installed your software. Check that the system requirements, such as the operating system version, are correct for the software you are using. Check that the computer has enough memory for your software. If you are running other software at the same time, using RAM resident programs, or using many device drivers, the computer may not have enough remaining memory. (See your software and computer manuals.)
The computer does not start up properly, or does not work at all.	Check that you have set up the computer and software properly. Check that the interface board and other expansion boards are installed correctly. (See your computer manual.)
The command error (Error message: E-C) occurs often and the scanner does not operate.	Check that your scanner software supports an Epson scanner. If it does, check that you properly installed and set up the software.

Problem	Solution
All or part of the image is distorted on the CRT display or on the printed output document.	
The entire image is distorted or blurred.	Check that the document is placed flat against the document table. You may have accidentally moved the document during scanning. Check the position of the document again and do not move it while the scanner is operating. The scanner may be tilted or located on an unstable surface. Check the location of the scanner, and locate it on a flat, stable surface.
Part of *the image is distorted or blurred.*	Part of the document may be wrinkled or warped or not in contact with the document table. Make this part flat. **CAUTION**: Do not place heavy objects on the document table. If the document glass is dirty, clean it.
The edges of *the document are not scanned.*	The document table has a non-scannable area around the edges. Adjust the position of your document so that the image is inside the scannable area. (See Chapter 2.)

Problem	Solution
All or part of the image is distorted on the CRT display or on the printed output document (continued).	
Color is patchy or garbled at the *edges* of *the document.*	If the document is very thick or warped at the edges, the edges may appear patchy or garbled. Place opaque paper on the back of the document covering the edges **to** avoid interference from external light. If a part of **the** document rests outside the document table, the document's edge may be colored. Reposition the document **so that** it rests within the document table.
The image is faint or uneven.	
The image is faint or out of focus.	Check that the document is placed flat against **the** document table. Check and adjust the gamma correction setting. The image looks lighter when gamma correction is set for a printer than when it is set for a CRT.

Problem	Solution
The image is faint or uneven (continued).	
The image is too dark on the CRT or on a printout, and details cannot be recognized.	Check that you enabled halftoning. Without halftoning, deep-colored areas may be scanned as black. Check that the gamma correction is set correctly for your output method. If it is set for **a** CRT display, the printout becomes darker than the original image. Adjust the brightness from the software. Also check the brightness and contrast volumes of your CRT screen.
The image is not scanned at all, or only a few dots appear.	Make the brightness setting darker, or try different settings and combinations of the scanner functions, especially gamma correction and resolution.
Straight lines in the image are jagged at their edges.	The document may be placed at an angle on the document table. Align it so that the horizontal and vertical lines are lined up with the horizontal scan and vertical scan directions. (See Chapter 2.)

Problem	Solution
The CRT display image is not what you expected.	
The scanned image does not look the same as the original image.	Try different settings and combinations of the scanner functions. (See Chapter 2.) Check that your software is correctly installed. Check the capability of your software and computer. (See your software and computer manuals.) If you are importing an image file into your application software, check that the file format is acceptable for your software. Also check that the settings on your software and your image **match.** (See your software manual.)
A line of dots is always missing on the scanned image.	If this happens on your printed image only, it is probable that your printer or its print head is malfunctioning. (See your printer manual.) If this happens both on your screen and printout, **the** scanner's sensor may be malfunctioning. Consult your dealer.
When using halftoning mode A, textured dots appear on particular areas of *an image.*	The scanner is working correctly. This effect appears on areas of consistent color or luminosity because the scanner tries to simulate tones from such input. To decrease this effect, use halftoning mode B. (See Chapter 2.)

Problem	Solution
The CRT display image is not what you expected (continued).	
Different colored dots appear scattered on a background.	This is normal when halftoning is selected. Halftoning simulates subtle differences of tones and luminosity of the original image with a number of bi-level dots. When the image is viewed from a suitable distance, it appears to be a similar color to your original.
In monochrome scanning, the image is too faint or certain colors are fainter than other colors.	If you selected standard monochrome scanning (no dropout color) using the scanner software, switch to monochrome and specify a dropout color. Then try different dropout colors until the image improves.
The image does not appear on the screen.	Check the installation and settings of your scanner software. If you are importing an image file into your application software, check the software's operation. Some software cannot show the image as it is on the screen, but can print properly on the printer. (See your software manual.)

Problem	Solution
The CRT display image is not what you expected (continued).	
The **color** *on the display seems different from that* of *the original image.*	Check the settings of the scanner functions, especially data format, gamma correction, and color correction. Try different combinations of these settings. (See Chapter 2.) Check the capability of your computer, display adapter, and software. Some computers can change the color palette to adjust colors on your screen. (See your computer manual.)
The image is distorted on the screen, or the horizontal and vertical proportions are different.	If the resolution is correctly set for your printer, your image will be in the correct proportion when printed. If the horizontal and vertical dot resolution of your display screen differ greatly, try different resolutions or zoom settings.
The printed image is not what you expected.	
The printout of *the image is too dark compared to the original image.*	Check that the gamma correction is set for a printer output setting. (If your software cannot set the gamma correction, use the DIP switches. (See Appendix D.)

Problem	Solution
The printed image is not what you expected (continued).	
The printout of *the image is too dark compared to the original image. (continued)*	Change the brightness setting with your software.
The printed **color** *seems different from that* of *the originals.*	Set the color correction for printers. Try different combinations of other functions. (See Chapter 2.)
The printed image is distorted, is larger or smaller than the original size, or the image is compressed or stretched from the original shape.	Check that the resolution matches that of the printer. Check that the zoom is set correctly for your desired size. If your printer and software offer different resolutions horizontally and vertically, adjust both the scanner's horizontal and vertical scan resolutions.
The image cannot be printed on the printer, the printout is garbled, or the printout is not an image.	Check that the printer is properly connected to the computer and is correctly set up. (See your printer manual.) Check that your software is properly installed and set up for your printer. (See your software manual.)

Appendix A

TECHNICAL SPECIFICATIONS

A

Scanner Specifications. A-2
Mechanical Specifications A-4
Electrical Specifications A-4
Environmental Conditions. A-5
External View and Dimensions. A-6

Initialization. A-7
Default Settings A-7

Scanner Specifications

Product name:	ES-300C Color Image Scanner
Scanner type:	Flatbed, color/monochrome
Sub-scanning method:	Movement of the scanning head
Photoelectric device:	CCD line sensor
Effective pixels:	2552 dots by 3508 dots at 300 dpi, 100%
Maximum document size:	8.5 inches by 11.7 inches (216 mm by 297 mm)
Resolution:	Horizontal scan: 300 dpi
	Vertical scan: 300 dpi
Output resolution:	50, 72, 75, 80, 90, 100, 120, 144, 150, 160, 180, 200, 240, 300, 320, 360, 400, 480, and 600 dpi selectable by software command
Scanning speed:	Monochrome mode: about 6.5 msec/line (typ.)
	Color page sequence mode: about 10 msec/line (typ.)
	Color line sequence mode: about 35 msec/line (typ.) (excludes data transfer time)
Color separation:	By switching light sources (green, red, blue)

Reading sequence:	Color page sequence mode: scans 3 times Color line sequence mode: scans 1 time Monochrome mode: scans 1 time (dropout color selectable)
Zoom:	***50%*** to 200% in 1% steps Horizontal scan and vertical scan zoom can be independently set by software command.
Image data:	1 bit to 8 bits per pixel
Gradation:	8 bits per pixel per color maximum
Brightness:	***7*** levels
Halftoning process:	***3*** modes: **A, B, C**
Gamma correction:	2 types for CRT display and 3 types for printer output
Color correction:	1 type for CRT display and 3 types for printer output, available in color line sequence mode only
Direct printing:	Epson LQ-860, LQ-2500, and LQ-2550 (with color ribbon), through parallel interface only Hewlett-Packard PaintJet (or HP 3630) color graphics printer, through parallel interface only

Interfaces:	Standard:	bidirectional parallel and **RS-232C** serial
	Optional:	SCSI (for Macintosh)
Light source:	Noble gas fluorescent lamps (3 lamps)	

Mechanical Specifications

Reliability:	Main unit: MCBF 100,000 cycles
Dimensions and weight:	Width: 12.6 in. (320 mm)
	Depth: 20.1 in. (510 mm)
	Height: 4.8 in. (123 mm)
	Weight: 19.8 lbs (9 kg)

Electrical Specifications

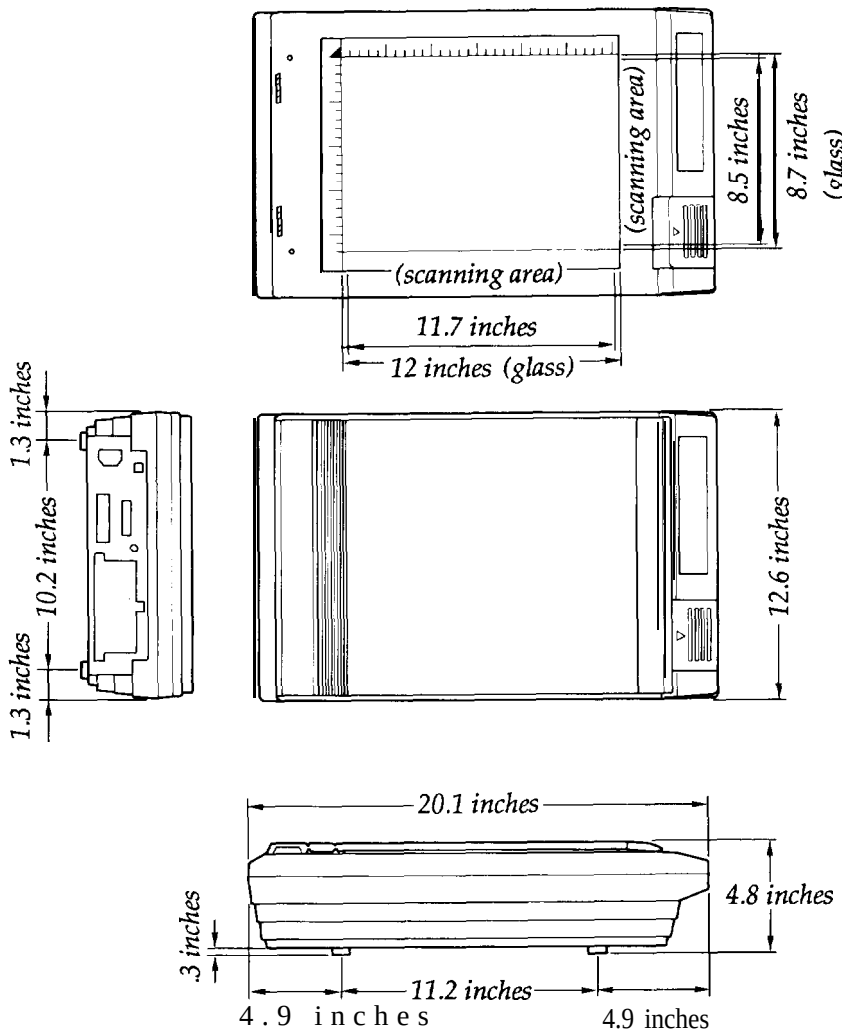
Voltage:	120 VAC, ± 10%
Frequency:	49.5 to 60.5 Hz
Power consumption:	40 VA max.
Insulation resistance:	20M ohms between AC power line and chassis at 500 VDC

Environmental Conditions

Temperature:	**Operation:**	41° F to 95° F **(5°C to 35°C)**
	Storage:	**-13°** F to 150° F (-25°C to 60°C)
Humidity:	Operation:	0% to 80%, without condensation
	Storage:	10% to 85%, without condensation
Operating conditions:	**Dust:**	Avoid operation in very dusty surroundings.
	Illumination:	Avoid operation under direct sunlight or near a strong light source.
Document conditions:	Reflective documents with smooth surface	

External View and Dimensions

(Unit: inches)



Note: Specifications and design are subject to change without notice.

Initialization

There are three ways that the scanner can **be** initialized (returned to a fixed set of conditions).

Hardware initialization:

- The power is turned **on.**
- The scanner receives an INIT signal at the parallel interface (pin 31 goes LOW).

Software initialization:

- The software sends an initialize command.

Default Settings

The table below shows the default conditions that take effect when the scanner is initialized.

Item	Default
Data format	1 bit/pixel
Resolution	100 dpi for horizontal scan and vertical scan
Zoom	100% for horizontal scan and vertical scan
Scanning area	848 x 1169 dots, no off set
Color mode	Monochrome
Brightness	Center “0” (normal)
Halftoning mode	DIP switch setting
Gamma correction	DIP switch setting
Color correction	DIP switch setting

During initialization, the scanner terminates the scanning operation and returns the carriage to the home position (at the back of the scanner).

Appendix B

CONNECTING THE SCANNER TO A PC

Using the Parallel Interface B-2
Setting Jumpers on the Bidirectional Parallel Interface Board B-2
The Parallel Interface Cable B-4
Connecting the Parallel Interface B-4
Identifying a Cable Problem B-5

B

Using the Parallel Interface

This appendix describes how you connect your ES-300C scanner to an IBM compatible computer. You connect the scanner using the bidirectional parallel connector on the back panel of the scanner.

The scanner's bidirectional parallel interface requires a compatible type of interface on your computer. If you have an IBM compatible computer, you must install the optional bidirectional interface board in the computer.

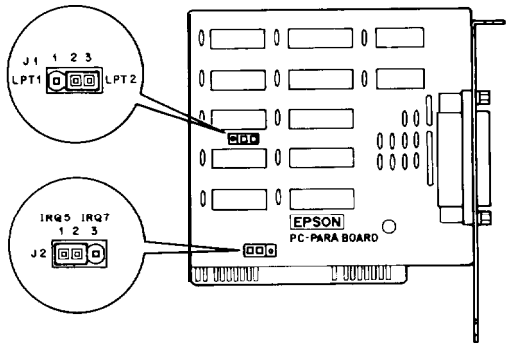
To install the bidirectional parallel interface board in your computer, follow the instructions in your computer's documentation for installing optional interface boards (or cards).

> **Note:** If you have an IBM PS/2™ computer, you can connect the scanner directly to its bidirectional parallel printer interface with a suitable shielded cable.

Setting Jumpers on the Bidirectional Parallel Interface Board

The bidirectional parallel interface board is specifically designed to connect the Epson ES-300C scanner to an IBM compatible computer. This board provides scanner control capability through bidirectional input and output, allowing the high speed transmission of data.

Two sets of jumper pins are located on the board. These jumpers allow you to configure the parallel interface port.



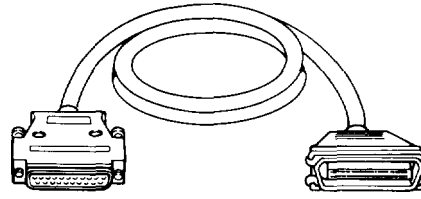
Jumper J1 selects the I/O port addresses, and jumper J2 selects the interrupt level. Select the address and interrupt level that are suitable for your computeis configuration.

J1	Data address	Status address	Control address
LPT1:	0378h	0379h	037Ah
LPT2:	0278h	0279h	027Ah

J2
IRQ7
IRQ5

The Parallel Interface Cable

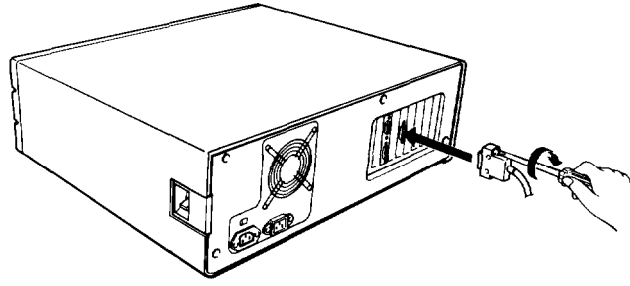
The parallel interface cable can be the same type as the one used for a printer connection. The computer end of the cable must be a DB-25 (D-sub 25-pin) female plug, and the scanner end must be a 36-pin Centronics® type connector.



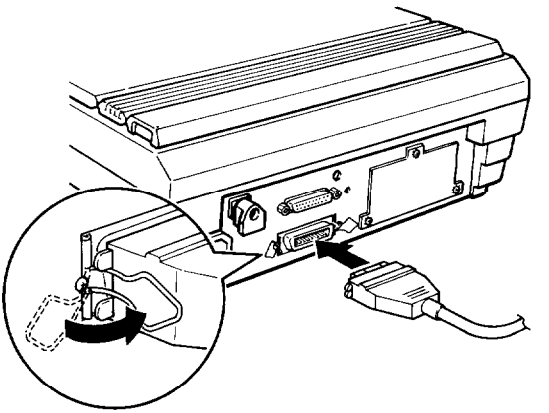
Connecting the Parallel Interface

Check that you have the correct parallel cable for the interface.

1. Make sure that both the scanner and computer are turned off.
2. Connect the 25-pin end of the cable to the connector on the bidirectional parallel interface board in the computer. Tighten the screws on the sides of the connector.



3. Connect the 36-pin end of the cable to the bidirectional parallel interface connector on the back panel of the scanner. Fasten the connector with the clamps on the sides of the connector.

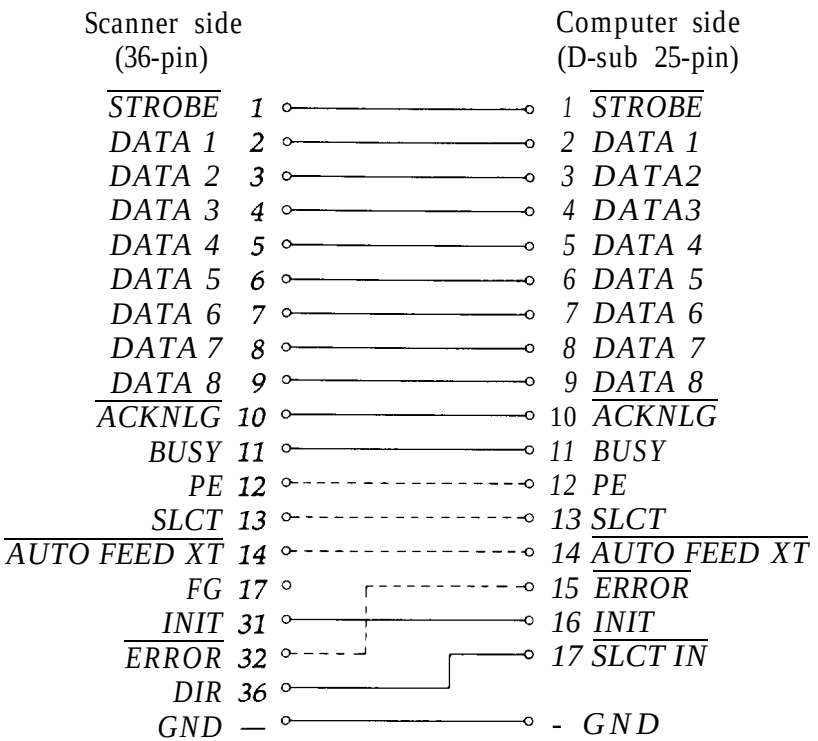


CAUTION: Connect only one interface cable at a time to the scanner. Attempting to connect more than one interface cable may produce radio interference that exceeds the specified limits.

Identifying a Cable Problem

If you are using a standard parallel interface cable, the scanner may not work properly even though the same cable works properly with a parallel printer. For example, if the fluorescent lamps come on but the scanner does not start, or if your software does not recognize the scanner, the wiring of the parallel cable may be incorrect.

The following illustration shows the recommended wiring for the bidirectional parallel interface cable. The dotted lines indicate wiring that is not required for the scanner to communicate with the computer.



If your scanner does not work properly with the parallel interface cable, see your dealer for assistance. Your dealer can provide a parallel cable with the correct wiring.

Appendix C

CONNECTING THE SCANNER TO A MACINTOSH

Using the SCSI Interface. C-2
- Introducing the SCSI Interface C-2
- Setting the SCSI ID C-2
- Setting Up the Terminators C-4

Installing the SCSI Interface Board. C-6

Connecting the Scanner to the SCSI Interface. C-10
- Connecting the Scanner as a Single SCSI Device C-10
- Connecting the Scanner to Other SCSI Devices C-11
- The Power on Sequence C-13

Removing the SCSI Board C-14

C

Using the SCSI Interface

This section introduces you to **the** SCSI interface. If you are unfamiliar with the SCSI interface, be sure to read this entire appendix thoroughly.

Introducing the SCSI Interface

The SCSI board included in the kit allows you to connect the ES-300C scanner to an Apple Macintosh computer using the industry-standard set of hardware and software specifications known as the Small Computer System Interface (SCSI).

This fast, simple interface was pioneered by Shugart and Associates and was originally called the Shugart Associates System Interface (SASI). The American National Standards Institute modified and added to the SASI specifications and renamed it **SCSI.** This interface has undergone several revisions and is currently defined by ANSI specifications X3.131-1986.

The SCSI interface allows you to connect up to eight devices, including the computer, in what is called a *daisy chain* arrangement. All devices connected through the interface are assigned a SCSI ID number so that they can recognize each other. When you use multiple SCSI devices, you need to pay attention to the terminators that affect the arrangement of the devices along the SCSI daisy chain. SCSI IDs and terminators are explained in more detail in the following sections.

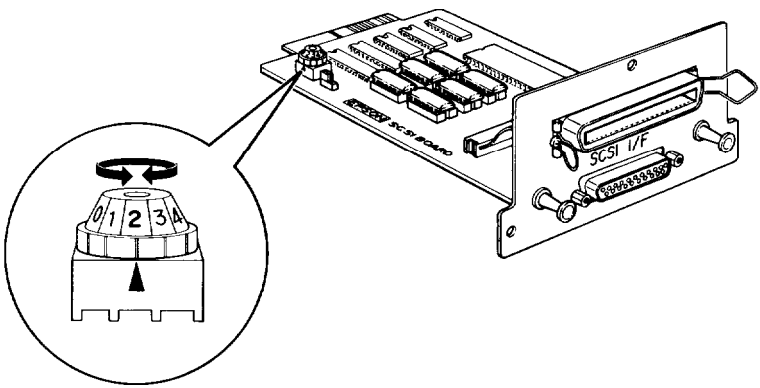
Setting the SCSI ID

The factory set SCSI ID of the scanner's SCSI board is 2. The computer is always ID number 7. You must assign any other devices a unique ID number between 0 and 6. If you are going to add the scanner to a system in which **one** of your SCSI devices already has a SCSI ID of 2, you must change the ID number of either that device or the SCSI board.

WARNING:

- Before handling the SCSI board, first touch a grounded metal object to release any static electricity on your body that may cause damage to **the** components of the board.
- Hold the interface by its edges and **the** shielding plate. Do not touch the edge connector or the components **on** the board.

1. Locate the rotary switch on the SCSI board to check or change the SCSI ID.
2. To change the SCSI ID, rotate the small dial on the top of the rotary switch until the number of the desired ID aligns with the mark on the dial.



CAUTION:

- Do not set the SCSI ID (the rotary switch) to 8 or 9. These numbers are not available for SCSI connection.
- Do not set the ID number to an ID that is already assigned to another device. If two or more devices have the same ID number, the computer, the scanner, and/or the other device will not function properly.

Setting Up the Terminators

For SCSI devices to communicate properly with each other, the SCSI interface requires special resistor packs known as terminators. These terminators are needed to reduce the echo, standing waves, and interference along the SCSI interface.

You must be aware of the following important points about terminators before you connect your scanner to the SCSI interface.

- You must have only two terminators on a SCSI daisy chain: one on the first and one on the last SCSI device.
- Terminators may be internal or external. Internal terminators are built into the SCSI device. External terminators are purchased separately and are installed on the SCSI device.
- If your Macintosh has a hard disk, the hard disk is the first SCSI device on the daisy chain. A Macintosh with an internal hard disk always has an internal terminator. A Macintosh with an external hard disk may have either an internal or external terminator.
- The scanner has an internal terminator so it must be the last SCSI device on the daisy chain.

CAUTION: Do not connect more than two devices with terminators along the SCSI interface. Having more than two terminators connected at one time could cause serious damage to the SCSI devices on the daisy chain.

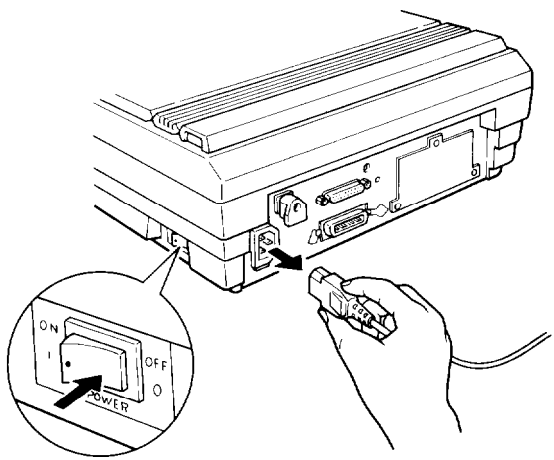
Installing the SCSI Interface Board

You install the SCSI board into the option board slot located on the back panel of the scanner as described below.

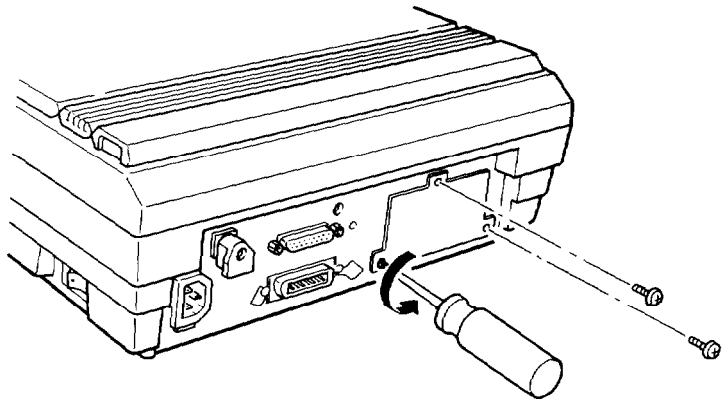
CAUTION: To connect the ES-300C in the middle of a daisy chain, you must have the terminator resistors removed from the SCSI board by your dealer before installing the board in the scanner.

1. Turn off the scanner and disconnect the power cable and any other interface cables connected to the scanner.

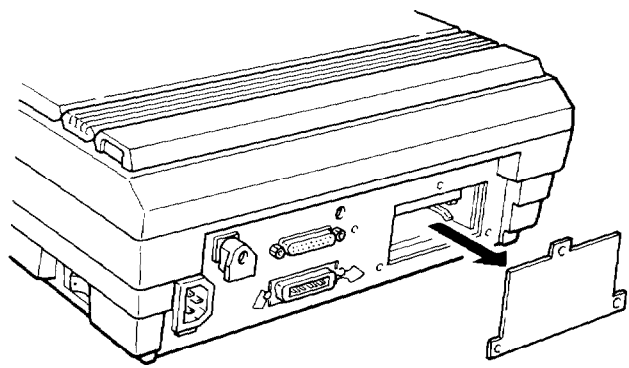
WARNING: Always turn off the power and disconnect the power cable before installing or removing an optional interface board,



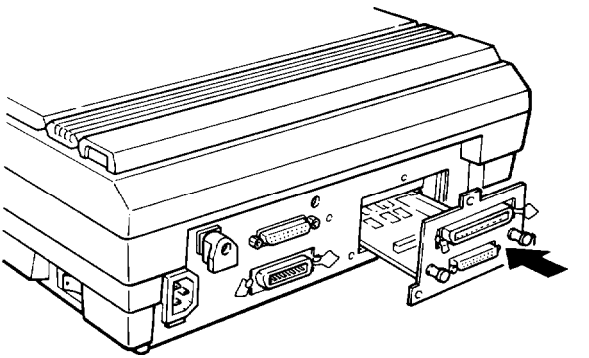
2. Remove the three screws that secure the interface slot on the **back** of the scanner.



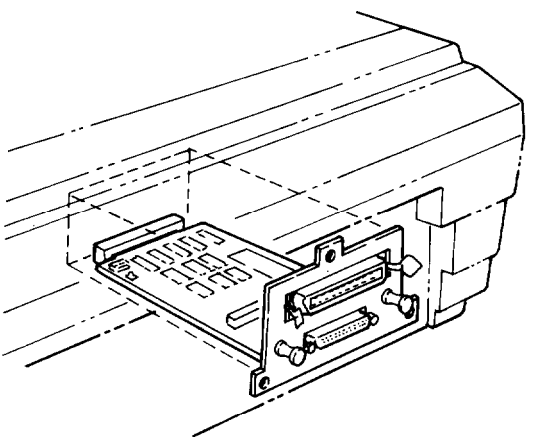
3. Remove the interface slot cover, Keep the cover in a safe place for future use.



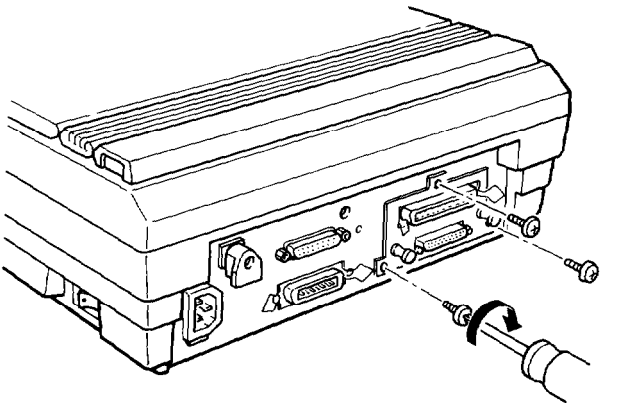
4. Holding the SCSI board by the shield plate, gently insert the board into the guides of the option slot. You will feel a slight resistance as the board connectors plug into the connectors inside the scanner. Press firmly to secure the connectors. If **the** board does **not** fit, do not force it; look to be sure you inserted the board evenly into the connectors.



5. Check that the board's back panel rests flush against the scanner's back panel.



6. When the board is properly installed, align the shield plate of the SCSI board with the three screw holes on the back panel of the scanner.



Connecting the Scanner to the SCSI Interface

This section shows you how to connect the ES-300C to the SCSI interface. Consult your dealer to obtain the proper SCSI interface cable.

CAUTION: If you have a Macintosh Plus, you must first set DIP switches SW1-1, SW1-2, and SW1-3 on your scanner to on. (See pages D-4 to D-7 for information on how to change DIP switch settings.)

Connecting the Scanner as a Single SCSI Device

The simplest connection hooks the computer directly to the scanner. To connect the scanner to the Macintosh, you need a 25-pin to 50-pin SCSI system cable.

1. Check that both the scanner and the Macintosh are turned off and unplugged from the power source.
2. Connect the 25-pin end of the cable to the SCSI port on the Macintosh. The SCSI port is the larger port with the diamond-shaped icon over it. Be sure that the cable is securely connected.
3. Connect the 50-pin end of the cable to the upper connector on the SCSI board.
4. Connect the power cables on both the computer and scanner. Plug the cables into electrical outlets.
5. Always turn on the scanner first; then start the computer.

CAUTION: Do not connect more than one interface cable to the scanner. When using the SCSI interface, make sure that no serial or parallel cables are connected to the scanner. When using another interface, disconnect the SCSI cable.

Connecting the Scanner to Other SCSI Devices

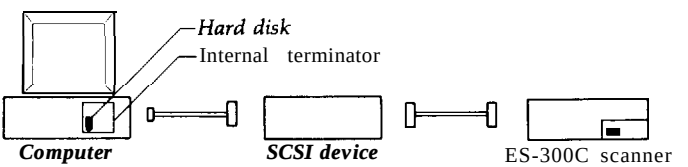
If you are connecting more than two SCSI devices in the daisy chain, you need a 50-pin to 50-pin SCSI peripheral cable.

> **CAUTION:** If you are connecting more than one SCSI device, be sure to read the previous sections on setting the SCSI ID number and setting the terminators. Failure to follow those guidelines could cause damage to or interfere with operation of the scanner and/or computer.

1. You must place the scanner (containing the SCSI board with an internal terminator) at the end of the daisy chain. The order of connection does not affect the speed of scanning operations.

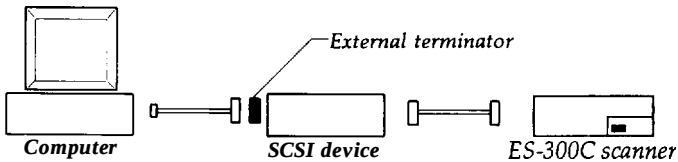
   If you have a Macintosh with an internal hard disk, the hard disk itself has a terminator and therefore is the first SCSI device in the daisy chain.

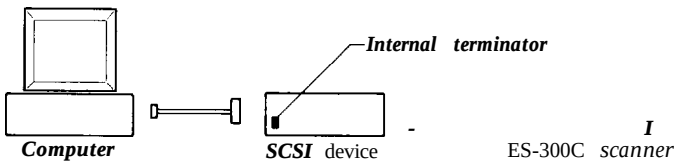
2. Attach any SCSI devices (without terminators or with terminator resistors removed by your dealer) to the middle of the chain as shown in the following illustration.



> CAUTION: Do not connect more than two devices with terminators to the SCSI interface. Having more than two terminators connected at one time could cause serious damage to the SCSI devices on the daisy chain.

3. If you have a Macintosh without an internal hard disk and you want to connect one or more SCSI devices in addition to the scanner, you must be sure the first SCSI device in the chain has a terminator (either external or internal) as shown in the illustrations below.





Normally, in this arrangement, the first SCSI device is an external hard disk.

Remember that you must place the scanner (with its built-in terminator) last on the daisy chain.

CAUTION: If you want to place the scanner in the middle of the SCSI chain, you must take your SCSI board to the dealer to have the terminator resistors removed. If you have already installed the SCSI board, see the section on removing the SCSI board later in this appendix. If you choose to place the scanner in the middle of the SCSI chain, you may need additional cables. Consult your dealer.

The Power on Sequence

SCSI devices with terminators (the first and last devices in the daisy chain) must be turned on before the Macintosh to allow information to pass through the SCSI interface. The Macintosh may not start up if these devices are not turned on. SCSI devices in the middle of the chain may be left off if you don't plan to use them at this time.

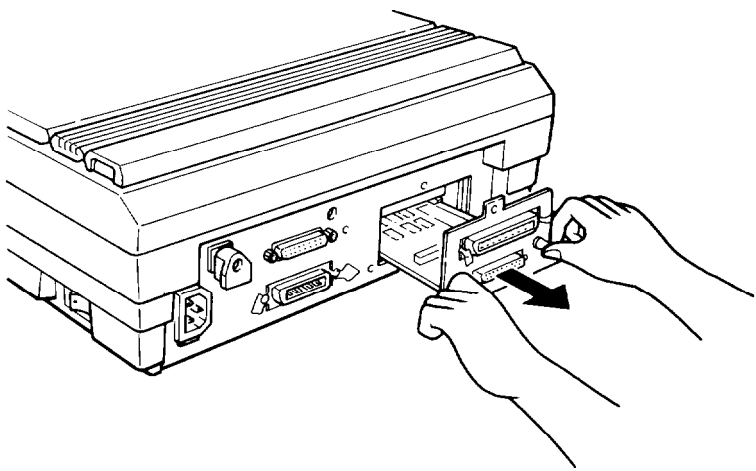
- If you have an internal hard disk, turn on the scanner and any other SCSI devices you plan to use. Wait a few seconds; then turn on the computer.
- If you have an external hard disk, turn on the scanner, external hard disk (first on the daisy chain), and any other SCSI devices you plan to use. Wait a few seconds; then turn on the computer.

Removing the SCSI Board

When you need to change the **SCSI** ID or take the SCSI board to your dealer, you must remove the SCSI board from the scanner.

1. Turn off the scanner and disconnect the power cable.
2. Remove the three retaining screws from the back panel of the SCSI board on the back of the scanner. Keep the retaining screws in a safe place.
3. Pull the board straight out using the remover grips.

CAUTION: Do not pull the board by the connectors or cables.



Note: If you are taking the SCSI board to your dealer, replace the slot cover on the back panel of the scanner to keep debris out of the unit.

Appendix D

DIRECT PRINT FUNCTION

About Direct Print. D-2
Choosing a Printer. D-2

Using the DIP Switches D-4
DIP Switch Factory Settings. D-4
Changing the DIP Switch Settings D-5
The DIP Switch Tables D-6

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Scanner Settings. D-10
Printer Settings. D-13
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Paper Size and Printable Size D-15

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Zoom and Printable Size D-18
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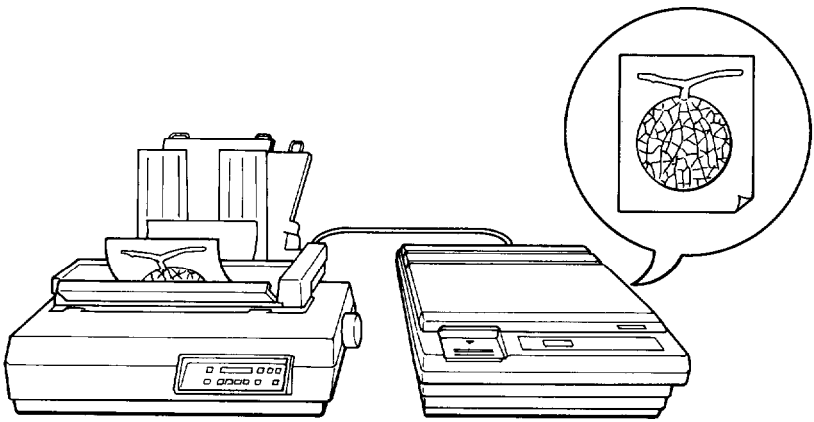
D

About Direct Print

The direct print function allows you to use your ES-300C scanner as a color copier if you have an Epson LQ-2500, LQ-2550, or LQ-860 printer with a color ribbon or an HP PaintJet or HP3630 color graphics printer with a parallel interface. With direct print, you connect the scanner directly to your printer and print the scanned image in color. Consult your dealer to obtain the special parallel interface cable required for the direct print function.



Choosing a Printer

You can use the direct print function only through the parallel interface of the scanner. You select your printer through the DIP switches as explained in the following section.

Note:

- This function does not work properly with monochrome (non-color) printers or 9-pin color printers.
- With an Epson 80 column printer or an HP PaintJet, the full scanning area of the ES-300C cannot be printed the same size as the original.
- This function cannot be used with an HP PaintJet printer that has an HP-IB interface or RS-232C interface.
- See the printer user's manual for details on your printer's operation.

Using the DIP Switches

The ES-300C has two sets of DIP switches located under the DIP switch cover to the left of the control panel.

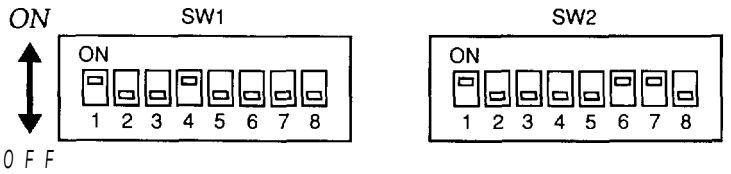
Change DIP switches in the following cases:

- If you have a Macintosh Plus computer. (See Appendix C.)
- When you use the direct print function.
- When your software cannot specify the functions that are selectable with DIP switches. (See your software manual.)

Note: Changes made to DIP switch settings while the scanner is **on** will not be effective until you turn the scanner off and then back on again.

DIP Switch Factory Settings

The DIP switches are set to the following positions at the factory:



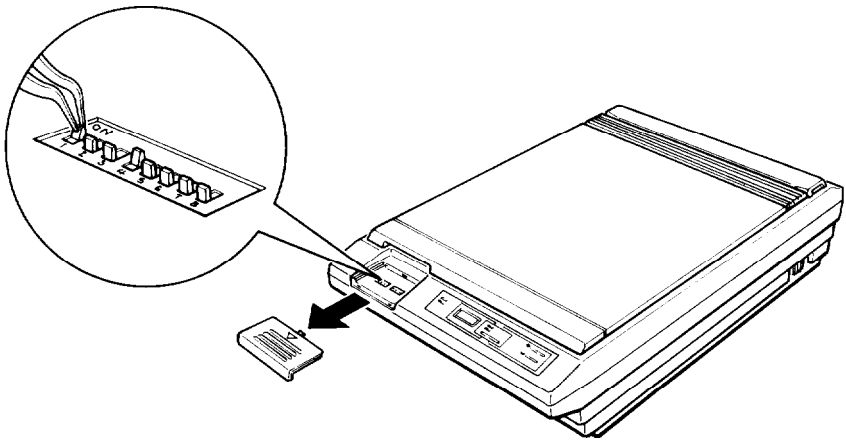
The values corresponding to the above factory settings are as follows:

Baud rate:	9600 bps
Stop bit:	2 bits
Parity check:	None
Printer type:	Epson 24-pin color printer (80 column) (for the direct print function only)
Halftoning mode:	Halftoning mode A
Gamma correction:	CRT Display A
Color correction:	CRT Display
Parallel interface:	Bidirectional

Changing the DIP Switch Settings

1. Turn off the scanner and remove the DIP switch cover by sliding it toward you.

2. Use a pen, tweezers, or other pointed object to change the DIP switch settings. A DIP switch is on when it is away from you and off when it is toward you.



3. Replace the DIP switch cover,

> **Note:** The new DIP switch settings take effect when you turn the scanner on. Changes you make to DIP switch settings while the scanner is on will not be effective until you turn the scanner off and then back on.

The DIP Switch Tables

The tables below show the settings for each DIP switch. The shaded boxes show the factory (default) settings.

DIP switch 1 settings

DIP switch 1 determines the serial interface protocols and the direct print function.

Table 2. DIP switch 1 settings

Switch No.	Function	ON	OFF
SW1-1	Baud rate	See table 2.	
SW1-2			
SW1-3			
SW1-4	Stop bit	2 bits	1 bit
SW1-5	Parity bit	Even	Odd
SW1-6	Parity check	Enabled	Disabled
SW1-7	Printer type for direct print.	See table 3.	
SW1-8			

Table 2. Baud rate

Baud rate	SW1-1	SW1-2	SW1-3
19200 bps	OFF	OFF	OFF
9600 bps	ON	OFF	OFF
4800 bps	OFF	ON	OFF
2400 bps	ON	ON	OFF
1200 bps	OFF	OFF	ON
600 bps	ON	OFF	ON
300 bps	OFF	ON	ON
SCSI/Macintosh Plus	ON	ON	ON

Table 3. Printer type for direct print

Printer type	SW1-7	SW1-8
Epson LQ-860 (with color ribbon)	OFF	OFF
HP PaintJet or HP3630 color graphics printer	OFF	ON
Epson LQ-2500 or LQ 2550 (with color ribbon)	ON	ON

DIP switch 2 settings

DIP switch 2 determines the scanner operation normally required for the direct print function. For normal scanning operations, your scanner software sets these scanner functions and overrides the current DIP switch settings. Therefore, except for the direct print function, you are unlikely to change these switches from the factory settings.

Table 4. DIP switch 2 settings

Switch No.	Function	ON	OFF
SW2-1 SW2-2	Halftoning mode	See table 5.	
SW2-3 SW2-4 SW2-5	Gamma correction	See table 6.	
SW2-6 SW2-7	Color correction	See table 7.	
SW2-8	Parallel interface direction	Unidirectional	Bidirectional

Note: Set switch SW2-8 to off for ordinary scanner operations. Set SW2-8 to on only when you use the direct print function.

Table 5. Halftoning mode

Halftoning mode	SW2-1	SW2-2
Disabled	OFF	OFF
Halftoning mode A	ON	OFF
Halftoning mode B	OFF	ON
Halftoning mode C	ON	ON

Table 6. Gamma correction

Gamma correction	SW2-3	SW2-4	SW2-5
CRT Display A	OFF	OFF	OFF
CRT Display B	ON	OFF	OFF
Printer Output A	OFF	ON	OFF
Printer Output B	ON	ON	OFF
Printer Output C	OFF	OFF	ON

Table 7. Color *correction*

Color correction	SW2-6	SW2-7
Impact dot matrix printer	OFF	OFF
Thermal transfer printer	ON	OFF
Ink jet printer	OFF	ON
CRT Display	ON	ON

Preparing for a Direct Print Operation

Before starting the direct print function, you need to make the appropriate settings on the scanner and the printer as described below, then connect them with a suitable parallel interface cable. Consult your dealer to obtain the proper parallel interface cable.

Scanner Settings

On the scanner, you have to set the interface direction, printer type, and scanning functions with the DIP switches. You may also want to set the zoom and brightness with the control panel buttons before you start a direct print operation.

Setting the interface direction

Set the DIP switch 2-8 to on when you want to use the direct print function.

Setting the printer type

Set DIP switches SW1-7 and SW1-8 to match the printer type you are using according to the table below. Do not set combinations other than those shown below. The LQ-2500 or LQ-2550 printer setting allows you to print the entire scanning area at the original image size.

Printer type	SW1-7	SW1-8
Epson LQ-860 (with color ribbon)	OFF	OFF
HP PaintJet or 3630 color graphics printer	OFF	ON
Epson LQ-2500 or LQ-2550 (with color ribbon)	ON	ON

CAUTION:

- Be sure to change SW2-8 to on. This changes the signal direction of the scanner's parallel interface, which must be set to unidirectional for the direct print function.
- After a direct print, be sure to set SW2-8 back to off. Otherwise the scanner does not work properly with the computer.
- Do not use the LQ-2500 or LQ-2550 printer setting when using an 80 column printer. You can use the LQ-860 setting with a 136 column printer, but the printable size is limited.

Setting the scanning functions

You can either select halftoning mode A or disable halftoning. To choose halftoning mode A, set SW2-1 on and SW2-2 off. Enable halftoning if your original image has continuous tones, as with photographs. Disable halftoning if the image does not have continuous tones, as with line art.

Note: Halftoning modes B and C are not effective in direct print.

For better output results, use DIP switches SW2-3 to SW2-7 to set the gamma correction and color correction settings to suit your printer type. See Chapter 2 for more information about gamma and color correction.

The recommended settings for **Epson** impact dot **matrix** color printers are as follows:

Gamma correction	SW2-3	SW2-4	SW2-5
Printer Output A	OFF	ON	OFF

Color correction	SW2-6	SW2-7
Impact dot matrix printers	OFF	OFF

The recommended settings for the HP PaintJet color printer are as follows:

Gamma correction	**SW2-3**	**SW2-4**	**SW2-5**
Printer Output A	OFF	ON	OFF

Color correction	**SW2-6**	**SW2-7**
Ink jet printers	OFF	ON

Note: For explanations on halftoning mode, gamma correction, and color correction, see Chapter 2.

Using the zoom and brightness modes

When you want to increase or decrease the size and/or lightness-darkness setting of the image you are going to scan during a direct print operation, follow these steps:

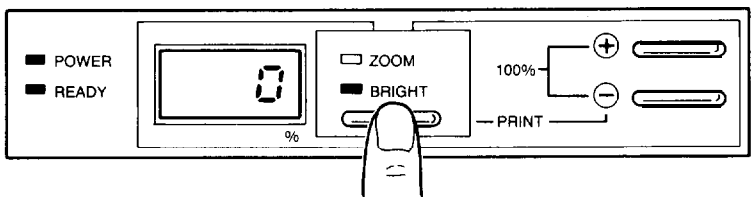
1. Place the document face down on the document table and close the document cover.

2. Turn on the scanner. The zoom mode is in effect and the display indicates 100%, the default zoom setting.

3. **Press** ⊕ **to** increase the image size or ⊖ **to** decrease the image size. The size range goes from 50% to 200% in 1% increments.

> Note: ⊕ and ⊖ on **the** control panel set the same values for both the horizontal scan zoom and the vertical scan zoom.

4. To select brightness mode, press the **ZOOM/BRIGHT** button. The display indicates 0 (normal) for the default brightness setting as shown in the illustration below.



5. Press ⊕ to increase **the** darkness of **the** image or ⊖ to decrease the darkness of the image. The lightness to darkness settings go from -3 (lightest) to 3 (darkest) in one-step increments.

Printer Settings

If you are using an Epson LQ-2500 or LQ-2550 printer, use the printer's SelecType function to set the following:

Interface:	Parallel
Left margin:	0
Right margin:	136
Print direction:	Unidirectional

On the LQ-2550 printer, also set **the** following:

Form length:	66 lines or **more**

If you are using an Epson LQ-860 printer, use the printer's DIP switches to select unidirectional printing for better results.

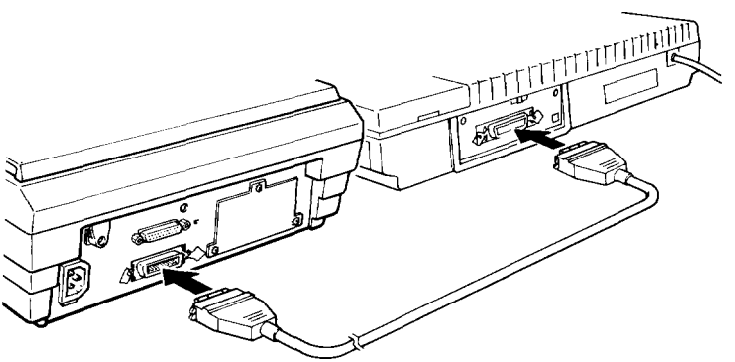
See your printer's manual for details on how to set these values.

Note: If you have changed the DIP switch settings or the interface type with SelecType, turn the printer off and back on to reset the printer's defaults.

Connecting a Printer to the Scanner

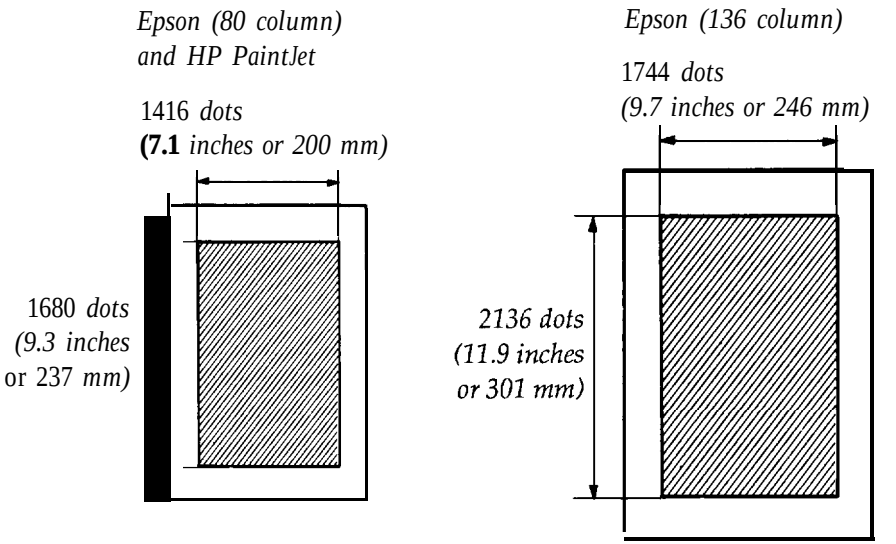
Use a standard parallel cable with a Centronics® type connector at each end to connect the scanner and printer for direct printing.

Note: Before connecting the cable, make sure that both the scanner and the printer are turned off.



Paper Size and Printable Size

The maximum printable sizes available with the direct print function are as shown **below.**



You can use any type of paper that is acceptable for your printer, including single sheets or continuous paper. Always make sure, however, that the paper you use is large enough to accommodate the printable size.

You can adjust the printed size of the image with the zoom function of the scanner. Details on the relation between zoom and printable size are explained later in this appendix.

CAUTION: Never use paper smaller than the printable size you choose. Printing beyond the paper can damage your printer.

Starting a Direct Print Operation

To start a direct print operation, follow the steps below:

1. Turn on the printer and then turn on the scanner.

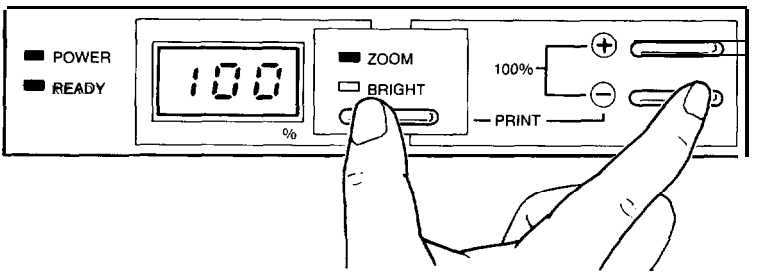
> **Note:** If the scanner is turned on first, its control panel may display an error message indicating that the scanner cannot detect the interface signals correctly. To return the scanner to normal, turn off the scanner and go back to step 1.

2. Make sure that the printer has paper and is on line (**ON LINE** light is on) and ready to print.

> **CAUTION:** Be sure that the paper is large enough to accommodate the image size you are going to print. Printing beyond the paper can damage your printer.

3. Place the document on the scanner. If you want to adjust the zoom and brightness settings, use the control panel as described earlier in this appendix.

4. Make sure that the scanner's **READY** light is on. Then press@ and **ZOOM/BRIGHT** at the same time. (These buttons are marked as **PRINT** on the control panel.) This starts direct printing. (The scanners **READY** light goes off during direct printing.)



5. When the scanner has finished scanning the image, its carriage returns to the **home** position and the **READY** light comes on.

Note:

- Because the printer is much slower than the scanner, the scanner occasionally stops scanning to allow the printer to catch up.
- Direct printing with a zoom setting of 100% takes about 7 minutes. At 50%, it takes about 5 minutes.

6. When printing is finished, set the printer off line and press the **FORM FEED** or **LOAD/EJECT** button to eject **the** printed paper. (The scanner does not send **a** form feed code after direct printing.)
7. When you have finished direct printing, turn off the scanner and printer and disconnect them from each other.

Tips for Direct Printing

This section provides information that may help you in using the direct print function.

Terminating a Direct Print Operation

Direct printing does not stop until the whole of the scanning area is scanned or the scanner is turned off. When the printer is set off line or runs out of paper, the scanner stops sending data. To resume printing, set the printer on line or load more paper.

To terminate direct printing in the middle of an operation, first set the printer off line to halt printing, then turn off the scanner. Remove the paper from the printer by pressing the **FORM FEED** or **LOAD/EJECT** button; then turn off the printer. (Do not use the platen knob.)

If you turn off the scanner before turning off the printer, the printer may be unable to go off line. In this case, turn the scanner back on, or turn the printer off and then back on again before removing the paper from the printer.

If you turn the printer off and back on again during direct printing, the scanner initializes itself and terminates direct printing.

Zoom and Printable Size

To allow for margins around the printable area for appropriate paper feeding and printing, the maximum size of printing is limited to be within the printable area of the printer type selected. For an 80 column printer, the maximum printable size is approximately 7.1 x 9.3 inches or 200 mm x 237 mm, and for a 136 column printer, it is approximately 9.7 x 11.9 inches or 246 mm x 301 mm.

As the zoom value increases, the percentage **of** scannable image decreases. If, for example, you have an 80 column printer and you are using direct printing, you must set the zoom value at 80% or less to scan and print an entire image. If you scan with a zoom setting of 100% with an 80 column printer, the scanner crops the right side and bottom of the image.

The relationship and approximate values of the scannable and printable sizes are shown in the tables below. The lengths in inches and millimeters are approximate values.

80 column printer (Epson 80 column and HP PaintJet)

Zoom	Scannable size inches	(mm)	Number of dots scanned	Printable size inches	(mm)
50%	8.5 x 11.5	(215 x 291)	760 x 1032	4.2 x 5.7	(107 x 146)
60%	8.5 x 11.6	(215 x 293)	912 x 1248	5.0 x 6.9	(129 x 176)
70%	8.5 x 11.6	(215 x 295)	1064 x 1464	5.9 x 8.1	(150 x 207)
80%	8.5 x 11.7	(216 x 296)	1224 x 1680	6.8 x 9.3	(172 x 237)
90%	8.5 x 10.4	(216 x 263)	1376 x 1680	7.6 x 9.3	(194 x 237)
100%	7.9 x 9.3	(200 x 237)	1416 x 1680	7.9 x 9.3	(200 x 237)
110%	7.2 x 8.5	(182 x 216)	1416 x 1680	7.9 x 9.3	(200 x 237)
120%	6.6 x 7.8	(167 x 198)	1416 x 1680	7.9 x 9.3	(200 x 237)
130%	6.0 x 7.2	(154 x 182)	1416 x 1680	7.9 x 9.3	(200 x 237)
140%	5.6 x 6.7	(143 x 169)	1416 x 1680	7.9 x 9.3	(200 x 237)
150%	5.3 x 6.2	(133 x 158)	1416 x 1680	7.9 x 9.3	(200 x 237)
160%	4.9 x 5.8	(125 x 148)	1416 x 1680	7.9 x 9.3	(200 x 237)
170%	4.6 x 5.5	(118 x 140)	1416 x 1680	7.9 x 9.3	(200 x 237)
180%	4.4 x 5.2	(111 x 132)	1416 x 1680	7.9 x 9.3	(200 x 237)
190%	4.1 x 4.9	(105 x 125)	1416 x 1680	7.9 x 9.3	(200 x 237)
200%	3.9 x 4.7	(100 x 119)	1416 x 1680	7.9 x 9.3	(200 x 237)

136 column printer (Epson 136 column)

Zoom	Scannable size inches	(mm)	Number of dots scanned	Printable size inches	(mm)
50%	8.5x11.5	(215x291)	760x1032	4.2x5.7	(107x146)
60%	8.5x11.6	(215x294)	912x1248	5.0x6.9	(128x176)
70%	8.5 x 11.6	(215 x 295)	1064 x 1464	5.9 x 8.1	(150 x 207)
80%	8.5 x 11.7	(216 x 296)	1224 x 1680	6.8 x 9.3	(173 x 237)
90%	8.5 x 11.6	(216 x 294)	1376 x 1872	7.6 x 10.4	(194 x 264)
100%	8.5 x 11.6	(216 x 295)	1528 x 2068	8.5 x 11.6	(216 x 295)
110%	8.5 x 10.8	(216 x 274)	1680 x 2136	9.3 x 11.9	(237 x 301)
120%	8.0 x 9.9	(205 x 251)	1744 x 2136	9.7 x 11.9	(246 x 301)
130%	7.5 x 9.1	(189x232)	1744x2136	9.7x11.9	(246x301)
140%	6.9 x 8.5	(176 x 215)	1744x2136	9.7x11.9	(246 x 301)
150%	6.5 x 7.9	(164x201)	1744x2136	9.7x 11.9	(246x301)
160%	6.1 x 7.4	(154x188)	1744x2136	9.7x11.9	(246x301)
170%	5.7 x 7.0	(145x177)	1744x2136	9.7x11.9	(246x301)
180%	5.4x6.6	(137x168)	1744x2136	9.7x11.9	(246x301)
190%	5.1 x 6.3	(130x159)	1744x2136	9.7x11.9	(246x301)
200%	4.9x5.9	(123x151)	1744x2136	9.7x11.9	(246x301)

Scanning Photographs and Pictures

If the image has continuous tones like photographs, use the halftoning mode A. In this mode, if your image has large areas of similar, constant tones, such as sky in the background, you might see textured patterns of dots appear. This is a normal result of this type of image processing. The image will look correct when viewed from a reasonable distance.

Scanning Line Art and Characters

Line art and text characters usually do not consist of continuous tones and do not require the halftoning process. The following settings are recommended for scanning line art.

Data format:	1 bit / pixel / color (bi-level)
Halftoning:	Disabled
Gamma correction	CRT Display A

If the line art contains many straight lines, adjust the document position so that lines are aligned with the horizontal scan or vertical scan directions. If the document is placed askew, the straight lines will have jagged edges.

Tips on Using Printers

On some printers, you can select unidirectional and bidirectional printing in the graphics printing mode. Selecting bidirectional increases the printing speed. Use unidirectional, however, for the highest quality printed results.

If the print quality is not as you expect, the color ribbon may be worn out. Replace the ribbon cartridge with a new one.

If Direct Print Does Not Work

This section discusses typical problems and offers possible solutions about operation of the direct print function.

The problems you may encounter while using the direct print function often involve inappropriate selection of the scanner functions and/or operation of your printer. See your printer documentation for possible solutions.

Problem	Solution
Direct print does not start or doesn't work as you expected.	Check that the cable connection is secure and the printer's settings are correct. Direct printing does not work properly on a monochrome printer or on a color printer equipped with a black ribbon.
The printout is garbled or an unrecognizable series of characters is printed.	Terminate the direct print. Check that the interface cable connection is proper and that the DIP switch settings on the scanner are correct. Also check the printer's settings.
The printout has white or dark lines between each line.	Check that the components, such as the color ribbon cartridge, are properly installed. If the printer still does not operate properly, consult your printer manual.
Print quality is poor.	Your color ribbon may be worn out. Replace the ribbon cartridge with a new one.

GLOSSARY

baud rate
A measure of the speed of data transmission. Usually equivalent to bits per second.

bi-level data
Image data that uses 1 bit per pixel. A single bit of digital data that can express only 1 (light) or 0 (dark) represents a pixel.

bit
A binary digit (0 or 11, which is the smallest unit of information used by a computer, scanner, or printer.

bit/pixel
Indicates the number of bits allocated for a pixel. The larger the value, the more detailed the pixel.

brightness
A scanner function to lighten or darken the output image data.

carriage
A component of the scanner that contains the optical sensor and light source for scanning. The carriage moves inside the scanner to perform the vertical scan while the sensor performs the horizontal scan.

color correction
A method of adjusting the color image data for a particular type of device so that the reproduction more closely matches the original colors.

data format
A scanner function used to determine how many bits are used to represent a pixel. The number of bits per pixel determines how many shades of gray or colors the scanned image can represent.

default
A value or setting that takes effect when the equipment is turned on, reset, or initialized.

document
The physical material, such as a sheet of paper or a book, containing the image you wish to scan.

dpi
Dots per inch. A unit of measurement for resolution. The higher the value, the higher the resolution.

dropout color
The color recognized by the scanner to have the same luminosity as white; therefore it is not scanned.

gamma correction
A method of adjusting the gamma so that the reproduction results on different types of output devices have gradations similar to those of the original image.

halftoning mode
A data processing method of converting continuous tones into digital data so that the output data simulates the tones. Used for bi-level and quad-level data.

home position
The position opposite the control panel where the scanner's carriage rests before a scanning operation.

impact printer
A type of printer that transfers ink onto the paper by striking the inked ribbon with a number of small pins.

initialize
To establish the initial default status of the scanner by turning on the scanner.

ink jet printer
A printer type that transfers ink onto the paper by spraying it through a number of small nozzles.

interface
Hardware, method, or standard used for connection between or among computer devices.

laser printer
A type of printer with an imaging system driven by a computer that allows the printer to compose an entire page in internal memory before printing.

line sequence
A type of color scanning in which the image is separated into colors line by line.

moiré pattern
An interfering pattern that may appear when two or more regular patterns are overlapped.

monochrome
Black and white, or images represented only by the intensity of luminosity.

multi-level data
Image data that consists of more than one bit per pixel.

origin
The starting point of scanning for the horizontal scan and vertical scan directions. Located at the upper right comer of the document table.

page sequence
A type of color scanning in which the image is separated into colors by scanning the entire image one time for each color.

parallel interface
A type of interface that transmits data eight bits at a time.

pixel
Short for picture element. Each pixel is comprised of units of dots, and an image is composed of a number of pixels.

plain bi-level
The bi-level image data without the halftoning process.

port
A channel or interface through which data is transmitted between devices.

quad-level data
Data that consists of two bits per pixel and can express four light to dark levels: 00 (light), 01, 10, and 11 (dark).

resolution
Indication of how finely an image is resolved into pixels. Measured in dpi.

scan
An operation performed by **the** sensor (horizontal **scan)** and the carriage (vertical scan). The image is divided into pixels by scanning.

scanning area
The physical size of the image that can be scanned by **the** scanner. Measured or determined by the number of dots for the horizontal scan and vertical **scan.**

self test
A built-in function to check the operation of the scanner.

thermal transfer printer
A printer type that transfers ink onto the paper with **heat** generated by **a** number of small heating elements.

zoom
A scanner function to enlarge or reduce the size of the image.

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